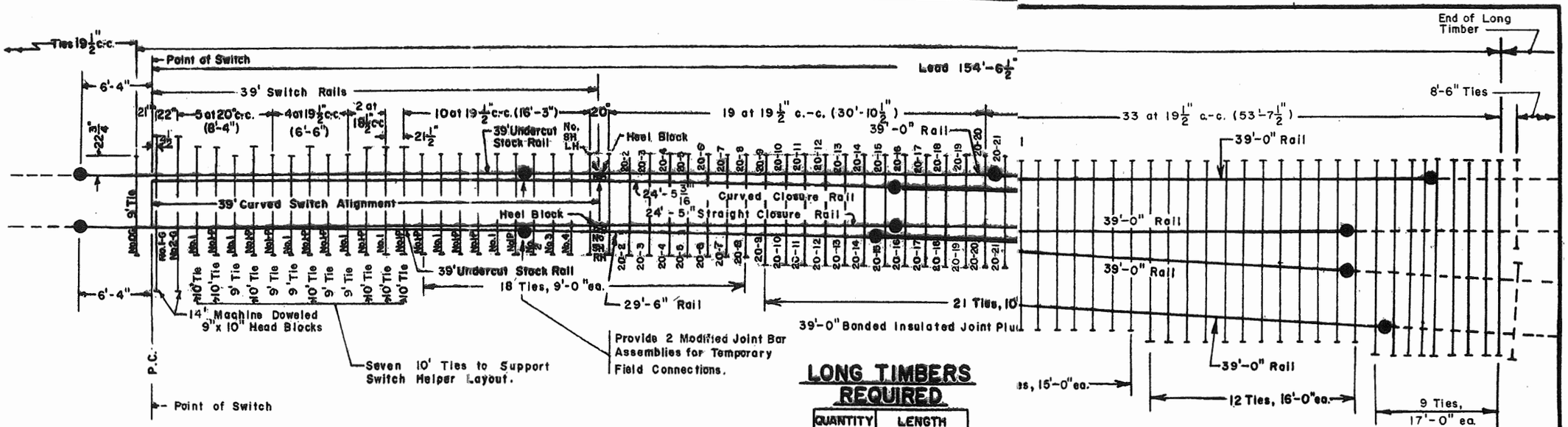


LONG TIMBERS REQUIRED

QUANTITY	LENGTH
24	9'-0"
28	10'-0"
17	11'-0"
13	12'-0"
13	13'-0"
14 *	14'-0"
12	15'-0"
12	16'-0"
9	17'-0"
142	Total

* Includes 2 - 9"x 10" Head Blocks

NOTES

1 – Stock rails and switch points and all rails furnished with the turnout are to be fully heat treated.

2 – Switch Points per A.R.E.A. Detail 5100 as shown on plan 2205.

3 – 39' stock rails, are to be undercut as per Plan 2205

4 – Gage plates O-G, I-G and 2-G as per Plan 2207

5 – Switch plates Nos. I and I-P as per Plan 2207

6 – For turnout plates behind heel, see Plan 2340.

7 – Vertical insulated switch rods and adjustable rocker clips generally as per Plan 2208

8 – Heel Blocks as per Plan 2350

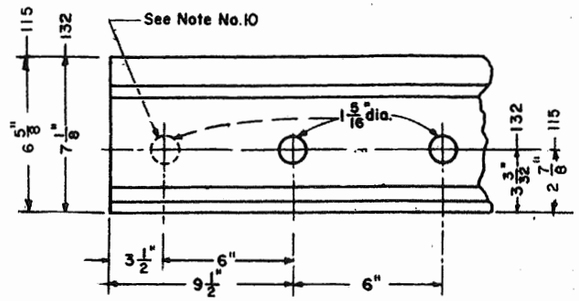
9 – For switch details see Plan 2205

10 – All rails, including switch rails, to be drilled as shown on this sheet, except that first hole is not to be drilled by the manufacturer. Forces, designated by the Authority, are to drill the first hole when necessary,

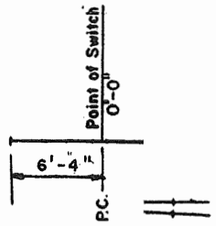
11 – All tie plates to be resiliently fastened, except, frog tie plates and guard rails.

12 – See Plan 2200 for Bill of Materials.

13 – Rail lengths are computed to allow a $\frac{1}{8}$" gap for temporarily bolting the field welded joints and $\frac{3}{16}$" gap for insulated joints. When rails are welded in the field, they must be cut to provide gaps recommended by the weld kit manufacturer.



RAIL END DRILLING



MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 2202

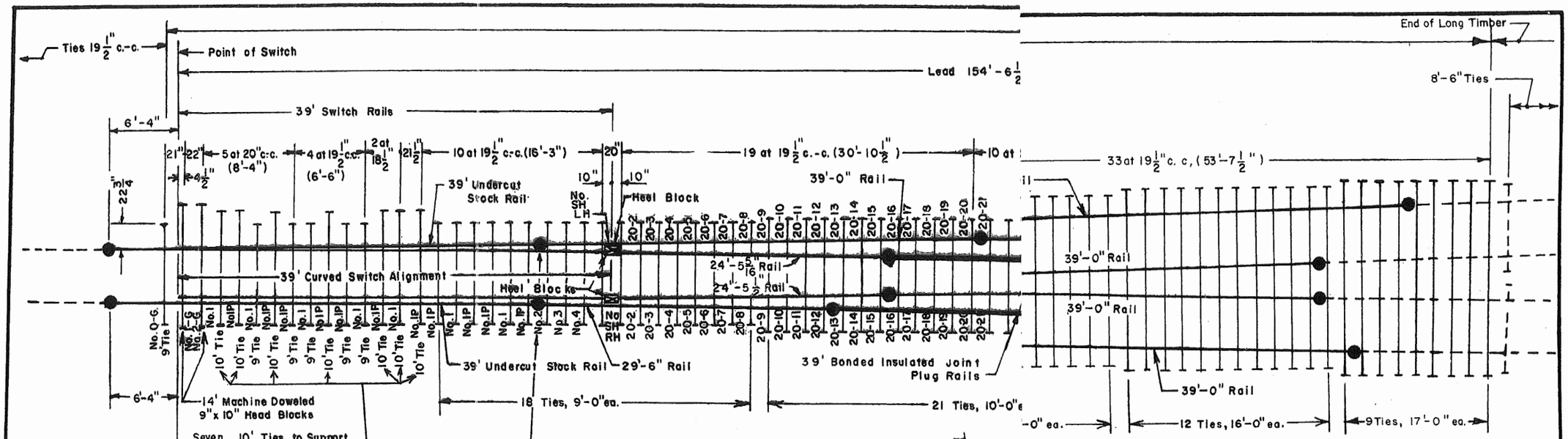
Apr. 29, 1996 ISSUE DATE

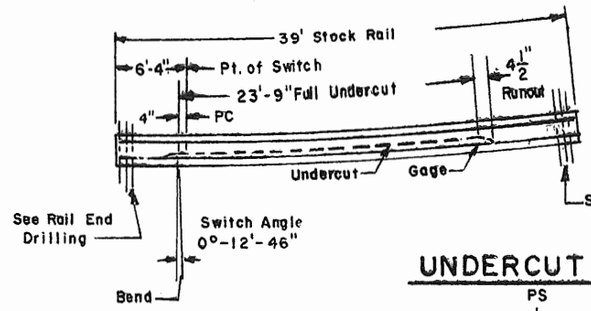
3 ISSUE NO.

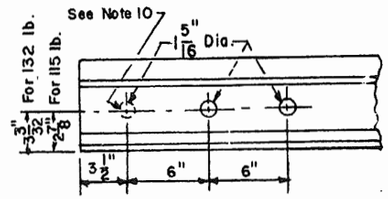
NO. 20 WELDED TURNOUT TIE AND RAIL LAYOUT

John D. Ray

SECTION CHIEF

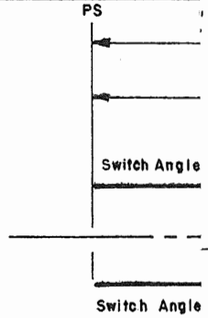






RAIL END DRILLING

UNDERCUT ST



NOTES

1- Stock rails, switch rails and all rail furnished with the turnout to be fully heat treated.
2- Switch Points per A.R.E.A. Detail 5100 as shown on dwg. 2205.
3- 39' stock rails are to be undercut as shown on this plan.
4- Gage plates 0-G, 1-G and 2-G as per plan 2207.
5- Switch plates Nos. 1 and 1-P as per plan 2207.
6- For turnout plates behind heel, see Plan 2340.
7- Vertical insulated switch rods and adjustable rocker clips generally as per plan 2208.
8- Heel blocks as per Plan 2350.
9- For switch details, see Plan 2205, modified as indicated for an equilateral.
10- All rails, including switch rails, to be drilled as shown on this sheet except that the first hole is not to be drilled by the manufacturer. MBTA forces to field drill first hole when necessary.
11- See Plan 2200 for bill of materials.
12- All tie plates to be resiliently fastened, except frog tie plates and guard rails.
13- Rail lengths are computed to allow a $\frac{1}{8}$" gap for temporarily bolting the field welded joints and $\frac{3}{16}$" gap for insulated joints. When rails are welded in the field, they must be cut to allow gaps recommended by the weld kit manufacturer.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

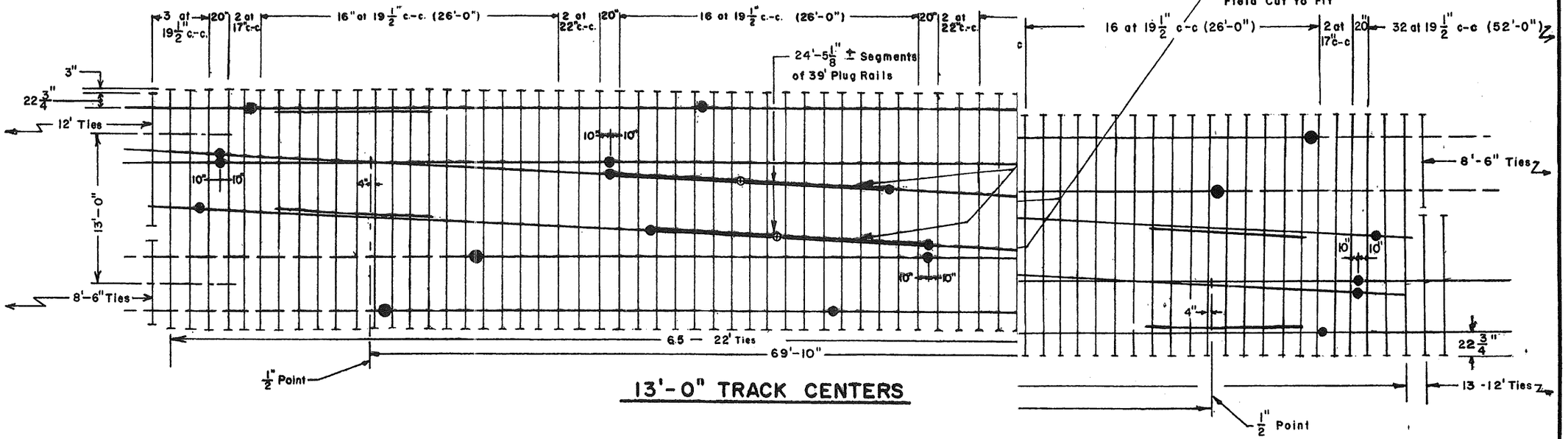
DWG. NO. 2203

Apr. 29, 1992 ISSUE DATE

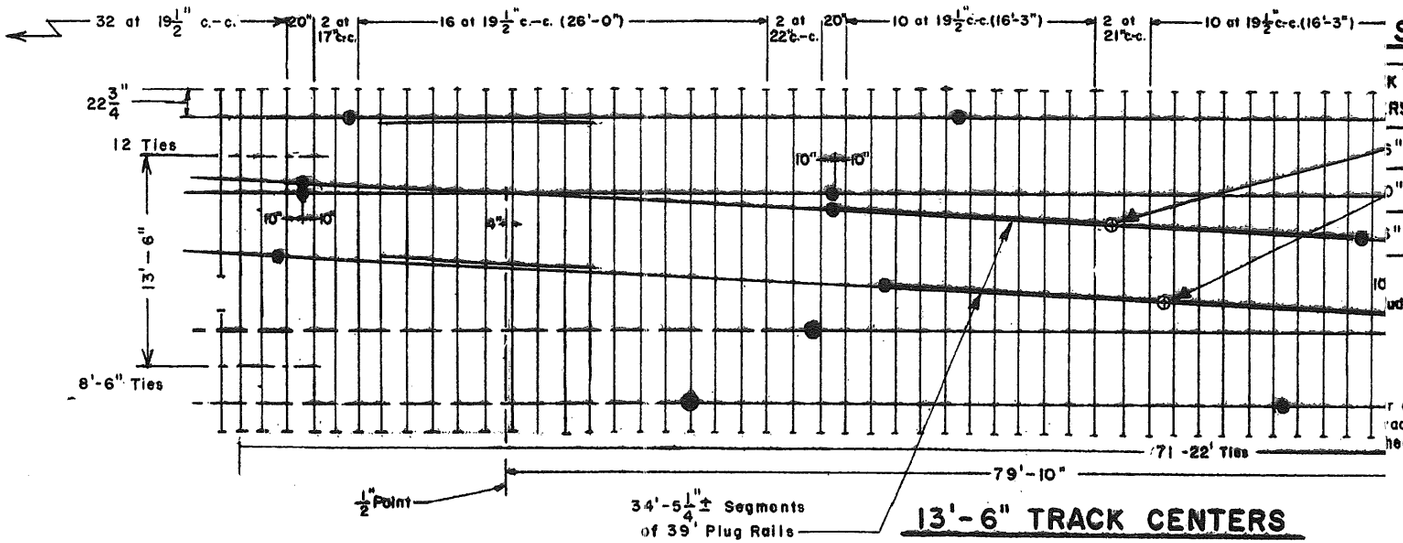
3 ISSUE NO.

NO. 20 EQUILATERAL TURNOUT TIE AND RAIL LAYOUT

John D. Reay
SECTION CHIEF



13'-0" TRACK CENTERS



13'-6" TRACK CENTERS

SWITCH TIMBER FOR A CROSSOVER

K RS	TIMBER LENGTHS							
	9'-0"	10'-0"	11'-0"	12'-0"	13'-0"	14'-0"	21'-0"	22'-0"
5"	48	56	34	26	—	4 ⊕	59	—
0"	48	56	34	26	—	4 ⊕	—	65
3"	48	56	34	26	—	4 ⊕	—	71
	(44)	(58)	(32)	(28)				

Figures in parenthesis are for floating heel block type turnouts.

ıdes 4 headblock ties – 9"x 10"

r exact
ack centers
hedule and

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

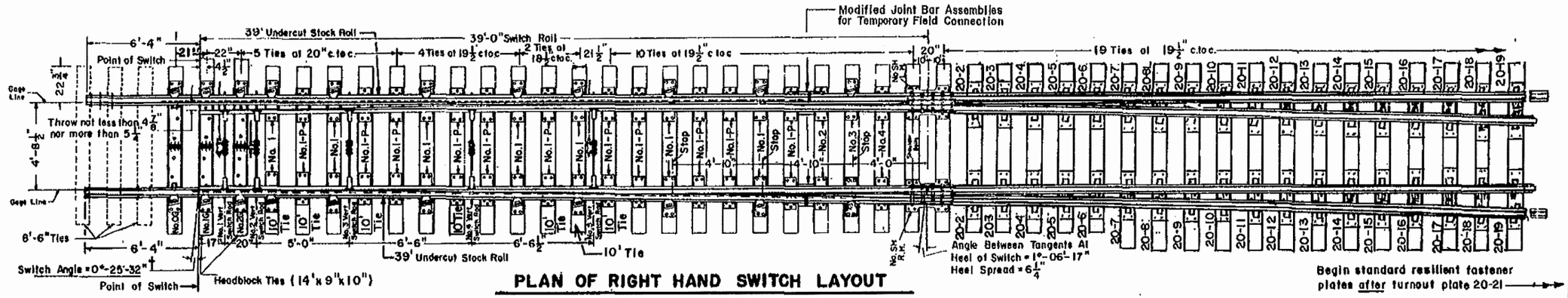
RAILROAD OPERATIONS

DWG. NO. 2204

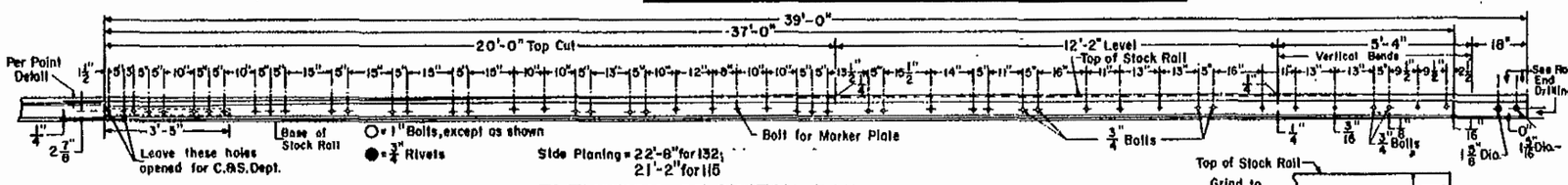
Apr. 29, 1996 (3)
ISSUE DATE ISSUE NO.

NO. 20 CROSSOVER TIE AND RAIL LAYOUT

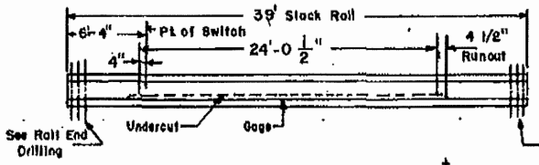
John D. Ray
SECTION CHIEF


Modified Joint Bar Assemblies for Temporary Field Connection
39' Undercut Stock Rail
39'-0" Switch Rail
Point of Switch
5 Ties at 20" c.to.c.
4 Ties at 19½" c.to.c.
2 Ties at 18½" c.to.c.
10 Ties at 19½" c.to.c.
19 Ties at 19½" c.to.c.
Gage Line
Throw not less than 4 7/8" nor more than 5¼"
8'-6" Ties
6'-4"
Switch Angle = 0°-25'-32"
Point of Switch
Headblock Ties (14"x 9"x10")
5'-0"
6'-6"
6'-6½"
39' Undercut Stock Rail
10' Tie
Angle Between Tangents At Heel of Switch = 1°-06'-17"
Heel Spread = 6¼"
Begin standard resilient fastener plates after turnout plate 20-21

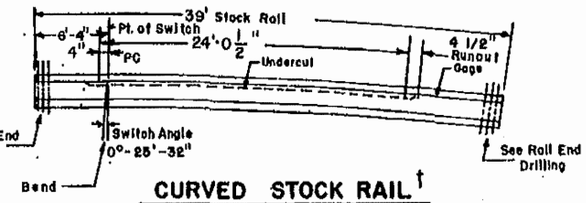
PLAN OF RIGHT HAND SWITCH LAYOUT



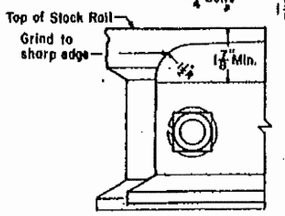
ELEVATION OF SWITCH RAIL



STRAIGHT STOCK RAIL †



CURVED STOCK RAIL †



END OF SWITCH RAIL

BILL OF MATERIAL

*1 –	Pair 39'-0" Switch Points, 1-R.H. straight and 1-L.H. curved, complete with reinforcing bars, clips and stops attached.
2 –	38'-0" Undercut Stock Rails.
5 –	Insulated Vertical Switch Rods, 2 with baskets. – Plan 2208.
2 –	Heel Block assemblies, complete. – Plan 2350.
3 –	Insulated Gage Plates Nos. 0-G, 1-G & 2-G.
14 –	No. 1 Adjustable Brace Slide Plates
2 –	No. 3 " " " "
22 –	No. 1-P Shoulder Slide Plates
2 –	No. 2 " " "
2 –	No. 4 " " "
2 –	No. SH Heel Plates, 1-R.H. and 1-L.H.
5 –	Switch Rail Stops.
10 –	Adjustable Rocker Clips for vertical switch rods. – Plan 2208.
40 –	Turnout Pocket Plates with welded pressed steel shoulders for resilient fasteners – Plan 2340.
22 –	Resiliently fastened Adjustable Rail Braces – Plan 2352.
4 –	(two pairs) Modified Joint Bar Assemblies.

Plan 2207

NOTES

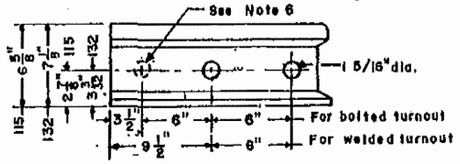
1 – This plan is for use with A.R.E.A. recommended standards for 115 or 132 R.E. rail.
2 – All rail to be fully heat treated.
† 3 – For stock rails, switch angles and offsets for an equilateral, see Plan 2203.
4 – All bolts shall be dipped immediately before applying (so that threads are thoroughly coated) in grease
* 5 – When ordering a Left Hand Switch, these items shall be opposite hand.
•6 – For bolted turnouts, the first bolt hole is to be drilled in the field.

TURNOUT INFORMATION †

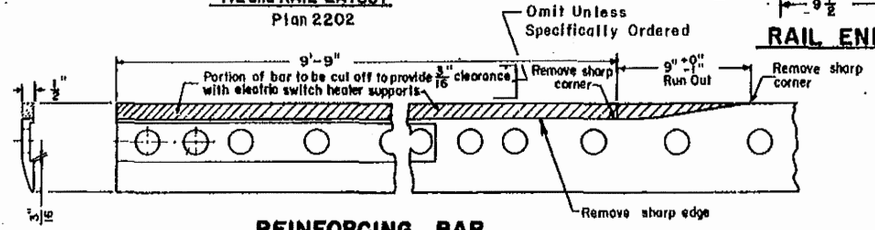
OFFSETS – Plan 2201

TIE and RAIL LAYOUT †

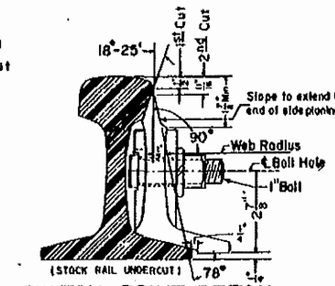
Plan 2202



RAIL END DRILLING


Omit Unless Specifically Ordered
9'-9"
Portion of bar to be cut off to provide 3/16" clearance with electric switch heater supports
Remove sharp corner
9" + 0" Run Out
Remove sharp corner
Remove sharp edge

REINFORCING BAR



SWITCH POINT DETAIL

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

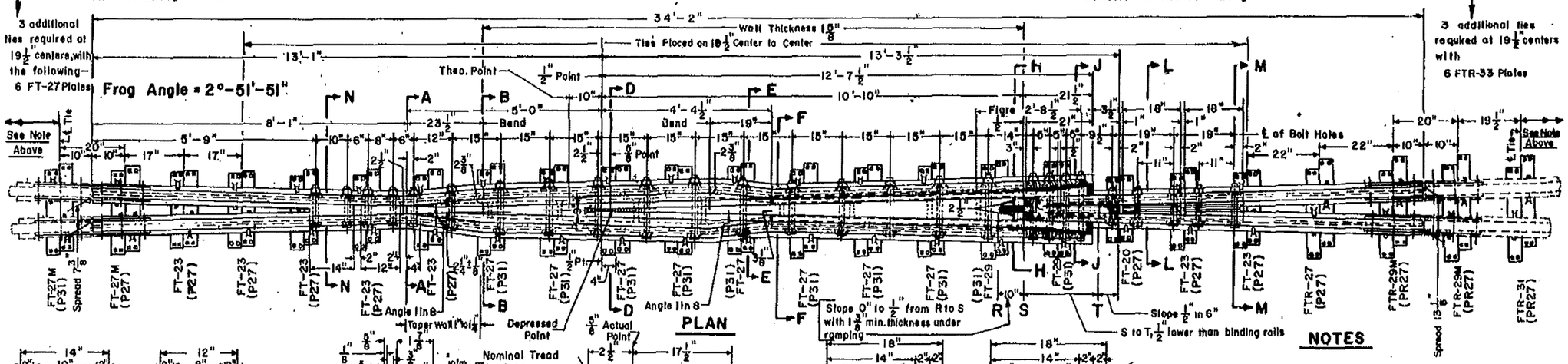
DWG. NO. 2205

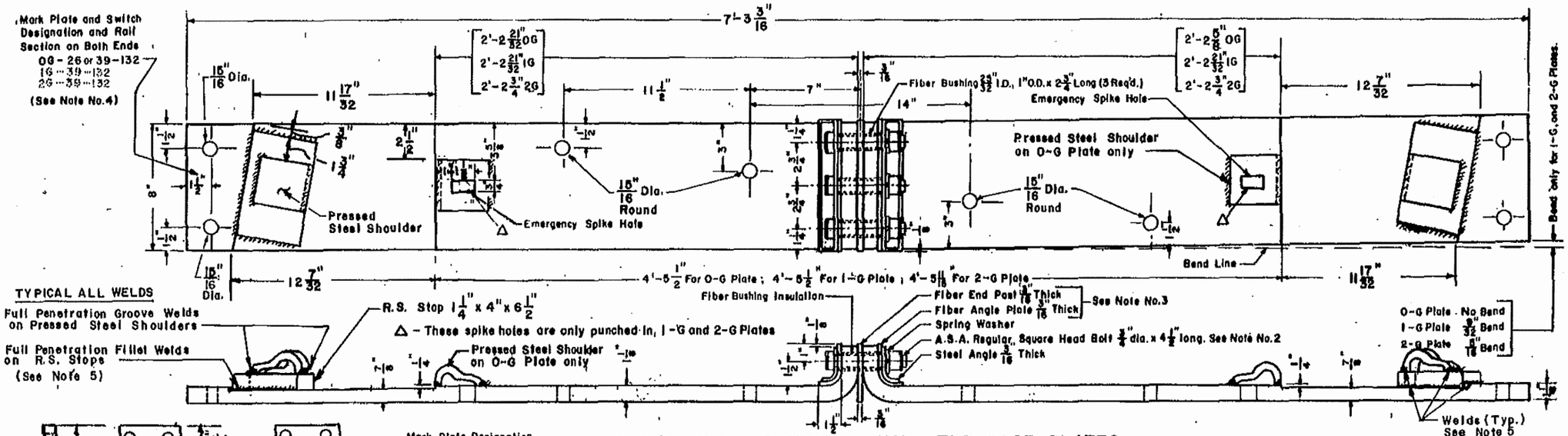
Apr. 29, 1996 (3)
ISSUE DATE ISSUE NO.

39'-0" CURVED SPLIT SWITCH

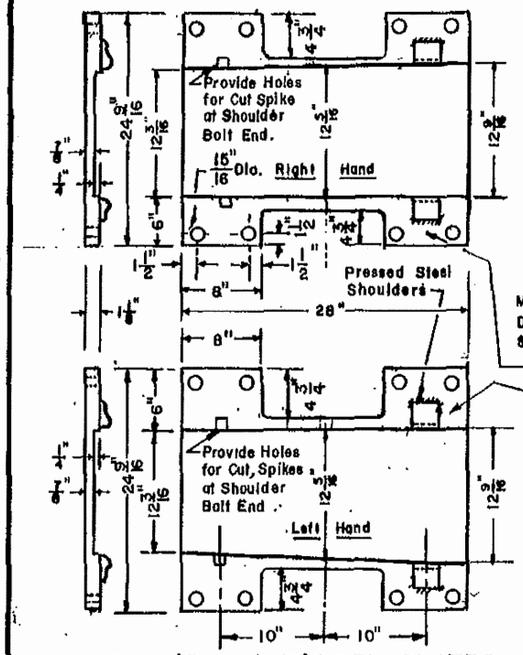
115 OR 132 R.E. RAIL – INSULATED & UNDERCUT

John D. Ray
SECTION CHIEF

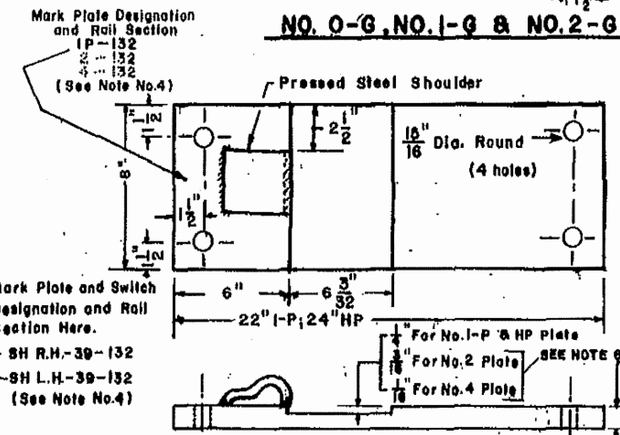

With Floating Heel Block Type Turnout, 3 additional ties at 20" centers and the following - 6 P31.
With Floating Heel Block Type Turnout, 3 additional ties at 19 1/2" centers and the following - 4 PR27 & 2 PR31.
3 additional ties required at 19 1/2" centers, with the following - 6 FT-27 Plates
3 additional ties required at 19 1/2" centers with 6 FTR-33 Plates
Frog Angle = 2°-51'-51"
34'-2"
Wall Thickness 1 5/8"
Ties Placed on 19 1/2" Center to Center
13'-1"
13'-3 1/2"
12'-7 1/2"
Theo. Point
1/2" Point
10'-10"
4'-4 1/2"
Bend
5'-0"
Bend
8'-1"
5'-9"
Figure 2'-8 1/2"
See Note Above
Angle I in 8
Taper Wall 1" to 1/2"
Depressed Point
Actual Point
Slope 0" to 1" from R to S with 1" min. thickness under ramping
S to T 1 1/2" lower than binding rails
Slope 1" in 6"
FT-27M (P31) Spread 7 3/8"
FT-27M (P27)
FT-23 (P27)
FT-23 (P27)
FT-23 (P27)
FT-23 (P27)
FT-27 (P31)
FT-27 (P31)
FT-27 (P31)
FT-27 (P31)
FT-27 (P31)
FT-27 (P31)
FT-27 (P31)
FT-29 (P31)
FT-20 (P31)
FT-20 (P27)
FT-23 (P27)
FT-23 (P27)
FT-27 (P27)
FTR-29M (PR27)
FTR-29M (PR27)
FTR-31 (PR27)
Spread 13 1/16"
PLAN
NOTES
TOE FILLER BLOCKS
Spreads shown are 5/8" down on rail head
SECTION AT POINT
Nominal Tread Surface
Slope 1" in 6"
ELEVATION OF POINT
Top Surface of Frog
45° to 3/8" Rad.
Bottom of Flangeway
Mark For 1/2" Working Point
HEEL FILLER BLOCKS
Spreads shown are 5/8" down on rail head
1- This plan is for use with A.R.E.A. recommended standards for 132 lb. or 115 lb. R.E. Rail, heavy wall section
2- Workmanship and materials shall be per current "A.R.E.A. Specifications"
3- Groove for bond wires shall extend from end of filler block at least to center line of second bolt hole.
4- All bolts used in construction of frog and switch material shall be dipped immediately before applying (so that all threads are thoroughly coated) in grease manufactured for this purpose.
5- When frog is to be used in bolted track, the first bolt hole to be drilled in the field by the installer.
6- Casting to be explosion hardened, with toe and heel arms to be fully heat treated rails.
7- Furnish SAS Plates unless otherwise Specified.
Beveled Washer
Beveled Headlock
H.T.C.S. Bolts
Spring Washer
SECTION N-N
SECTION A-A
SECTION Y-Y
SECTION AT TOE AND HEEL END OF MANGANESE
Fitting Pads 1" Wide
1" Rib
SECTION B-B
SECTION D-D
SECTION E-E
SECTION F-F
132 lb.
115 lb.
1 1/2" min. 2" max. where tail lowering 0" Taper floor thickness from 2" to 1 3/8" in 10"
See Note No.3
SECTION H-H
SECTION J-J
SECTION L-L
SECTION M-M
BEVELED END OF RAIL
PLANING AT END OF WING RAIL
See Note No.6
RAIL DRILLING
FROG TIE PLATES REQUIRED
2 - FT 20
14 - FT 23
22 - FT 27
4 - FT 27 Modified
4 - FT 29
2 - FTR27
4 - FTR29 Modified
2 - FTR31
6 - FTR33
Plan 2326
or (See Note 7)
20 - P27 SAS (Self Adjusting Shoulder)
28 - P31 SAS
10 - PR27 SAS
2 - PR31 SAS
Plan 2328
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
RAILROAD OPERATIONS
DWG. NO. 2206
Jan. 5, 1996
ISSUE DATE
3
ISSUE NO.
No. 20 RAILBOUND MANGANESE STEEL FROG
FOR 115 LB. OR 132 LB. R.E. RAIL
John D. Ray
SECTION CHIEF


Mark Plate and Switch Designation and Rail Section on Both Ends
0G - 26 or 39 - 132
1G - 39 - 132
2G - 39 - 132
(See Note No.4)
7'-3 3/16"
Pressed Steel Shoulder
Emergency Spike Hole
15/16" Dia. Round
Fiber Bushing 25/32" I.D., 1" O.D. x 2 3/4" Long (3 Req'd.)
Pressed Steel Shoulder on 0-G Plate only
Bend Line
Bend only for 1-G and 2-G Plates.
4'-5 1/2" For 0-G Plate ; 4'-5 1/2" For 1-G Plate ; 4'-5 1/2" For 2-G Plate
TYPICAL ALL WELDS
Full Penetration Groove Welds on Pressed Steel Shoulders
Full Penetration Fillet Welds on R.S. Stops
(See Note 5)
R.S. Stop 1 1/4" x 4" x 6 1/2"
△ - These spike holes are only punched in, 1-G and 2-G Plates
Fiber Bushing Insulation
Fiber End Post 1/16" Thick
Fiber Angle Plate 3/16" Thick
See Note No.3
Spring Washer
A.S.A. Regular, Square Head Bolt 3/4" dia. x 4 1/2" long. See Note No.2
Steel Angle 3/16" Thick
0-G Plate - No Bend
1-G Plate 9/32" Bend
2-G Plate 5/16" Bend
Welds (Typ.) See Note 5

NO. 0-G, NO. 1-G & NO. 2-G INSULATED GAGE PLATES

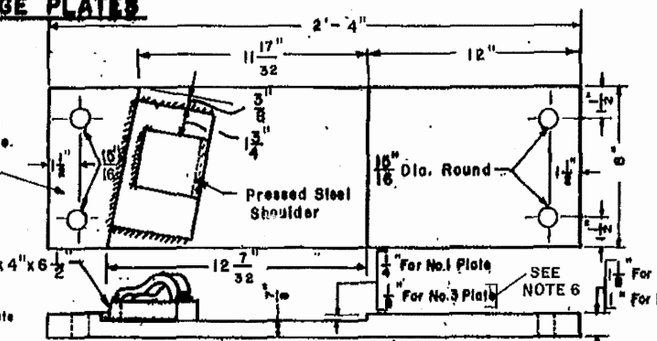


NO. SH (R.H. & L.H.) HEEL PLATES


Mark Plate Designation and Rail Section
1P - 132
2 - 132
4 - 132
(See Note No.4)
Pressed Steel Shoulder
15/16" Dia. Round (4 holes)
Mark Plate and Switch Designation and Rail Section Here.
22" 1-P; 24" HP
For No.1-P & HP Plate
For No.2 Plate
For No.4 Plate
SEE NOTE 6

These Plates Are Used With 26 Ft. or 39 Ft. Switch

NO. 1-P, NO. 2, NO. 4 & NO. HP SHOULDER SLIDE PLATES



These Plates Are Used With 26 Ft. or 39 Ft. Switch

NO. 1 & NO. 3 ADJUSTABLE BRACE SLIDE PLATES

7 - For adjustable brace used with these plates, see Dwg. No. 2352

NOTES:

1 - Switch Plates shall conform to current A.R.E.A. Specifications for Low-Carbon Steel Tie Plates, with copper.

2 - All gage plate bolts shall have A.S.A. Regular square heads and A.S.A. Heavy square nuts. All bolts shall be carbon-steel with medium-carbon steel nuts and conform to current A.R.E.A. "Specifications for Heat-Treated Carbon-Steel Track Bolts and Carbon Steel Nuts."

3 - All fiber parts shall conform to current A.A.R. Signal Section Manual, Part 58, Specification No. 13 for "Hard Fiber" and A.A.R. Signal Section Manual, Part No. 178 covering "Requisites for Fabricated Fiber Parts for Track Insulation."

4 - Each plate shall be marked by deeply cut characters, not less than 1/2" high, in the position as indicated on this plan.

5 - Welds shall be made so that they do not interfere with the installation of resilient fasteners and rail braces.

6 - Modify contour of pressed steel shoulders or shim plates 2, 3 & 4 to maintain uniform toe pressure from the resilient fasteners.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 2207

Oct. 28, 1992 (2)

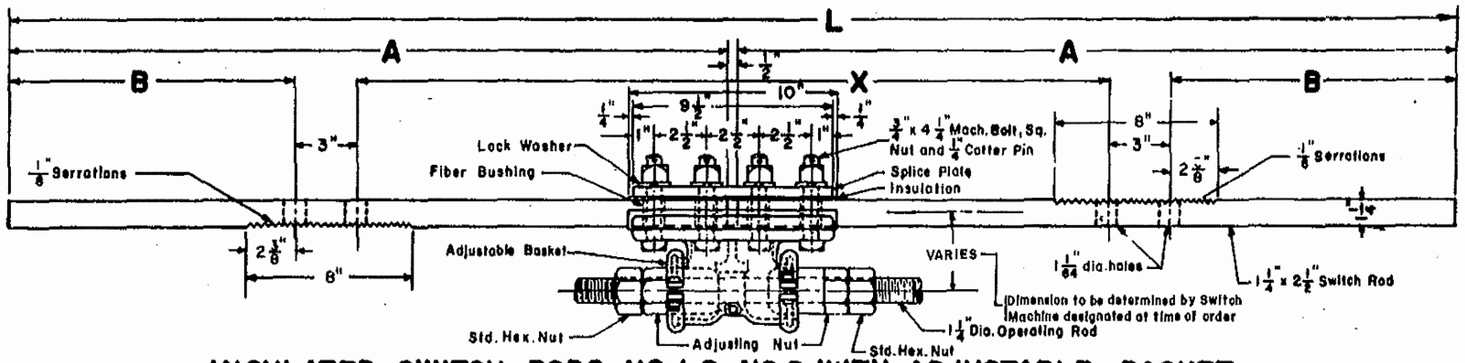
ISSUE DATE ISSUE NO.

SWITCH PLATES and GAGE PLATES

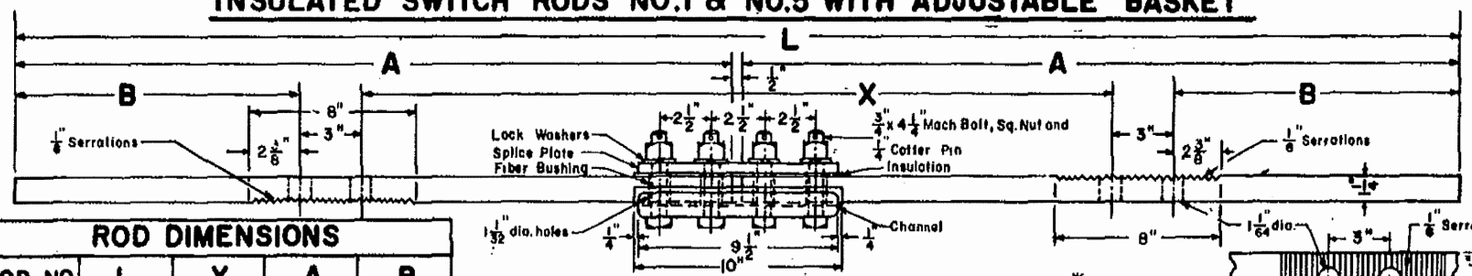
FOR 39'-0" SWITCH-132 LB RAIL

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



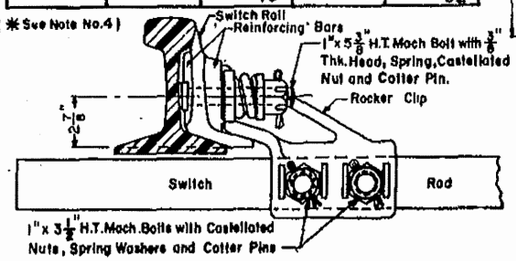
INSULATED SWITCH RODS NO.1 & NO.5 WITH ADJUSTABLE BASKET



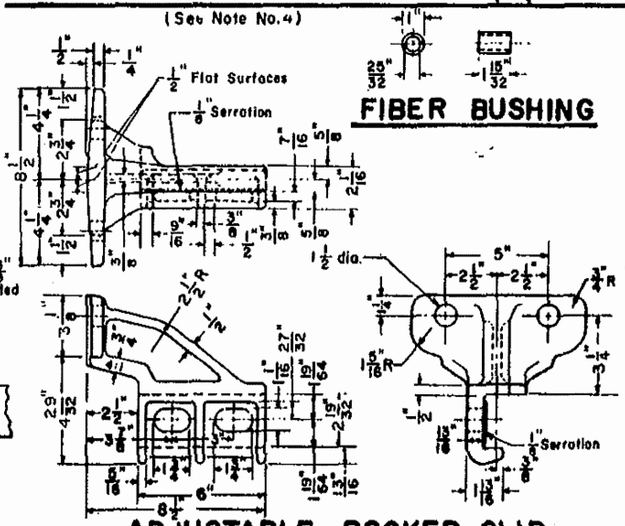
INSULATED SWITCH RODS-NOS. 2,3,4 & 6*

(See Note No.4)

ROD NO.	L	X	A	B
1	5'-10"	2'-11 7/8"	2'-10 3/4"	14 1/16"
2	5'-10"	2'-11 15/16"	2'-10 3/4"	14 1/16"
3	4'-4"	3'-0 11/32"	2'-1 3/4"	4 53/64"
4	5'-10"	3'-1 7/16"	2'-10 3/4"	13 9/32"
5	5'-10"	3'-2 7/16"	2'-10 3/4"	12 25/32"
* 6	5'-10"	3'-2 7/16"	2'-10 3/4"	12 25/32"

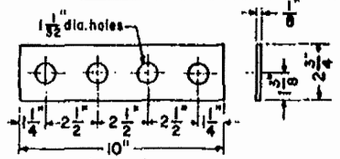

(* See Note No.4)
Switch Rail Reinforcing Bars
1"x5⅜" H.T. Mach Bolt with ⅜" Thk. Head, Spring, Castellated Nut and Cotter Pin.
Rocker Clip
Switch
Rod
1"x3½" H.T. Mach. Bolts with Castellated Nuts, Spring Washers and Cotter Pins

ASSEMBLED ROCKER CLIP

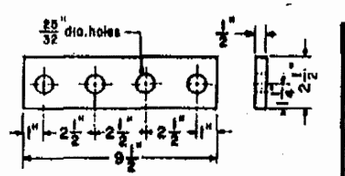


ADJUSTABLE ROCKER CLIP

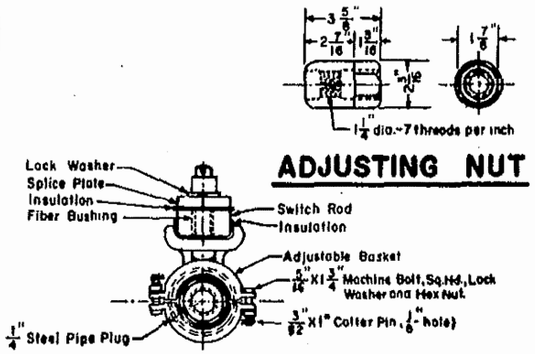
FIBER BUSHING

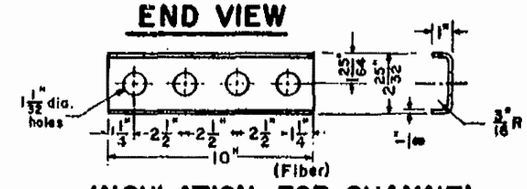


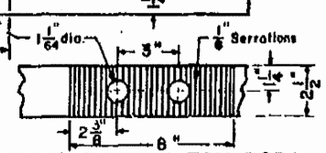
INSULATION PLATE FOR SPLICE PLATE

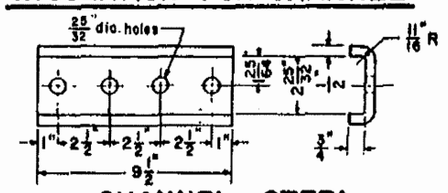


SPLICE PLATE









NOTES

1- All switch rods shall conform to current A.R.E.A. Specifications.

2- All fiber parts shall conform to current A.A.R. Signal Section Manual, Part 58, Specifications 13 - Hard Fiber.

3- Each switch rod shall be marked with deeply cut characters, not less than ½" high, with rod designation and rail section.

* 4- No.6 Rod is not required for turnouts with solid heel blocks but is required with floating heel blocks.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 2208

Oct. 28, 1992 (2)

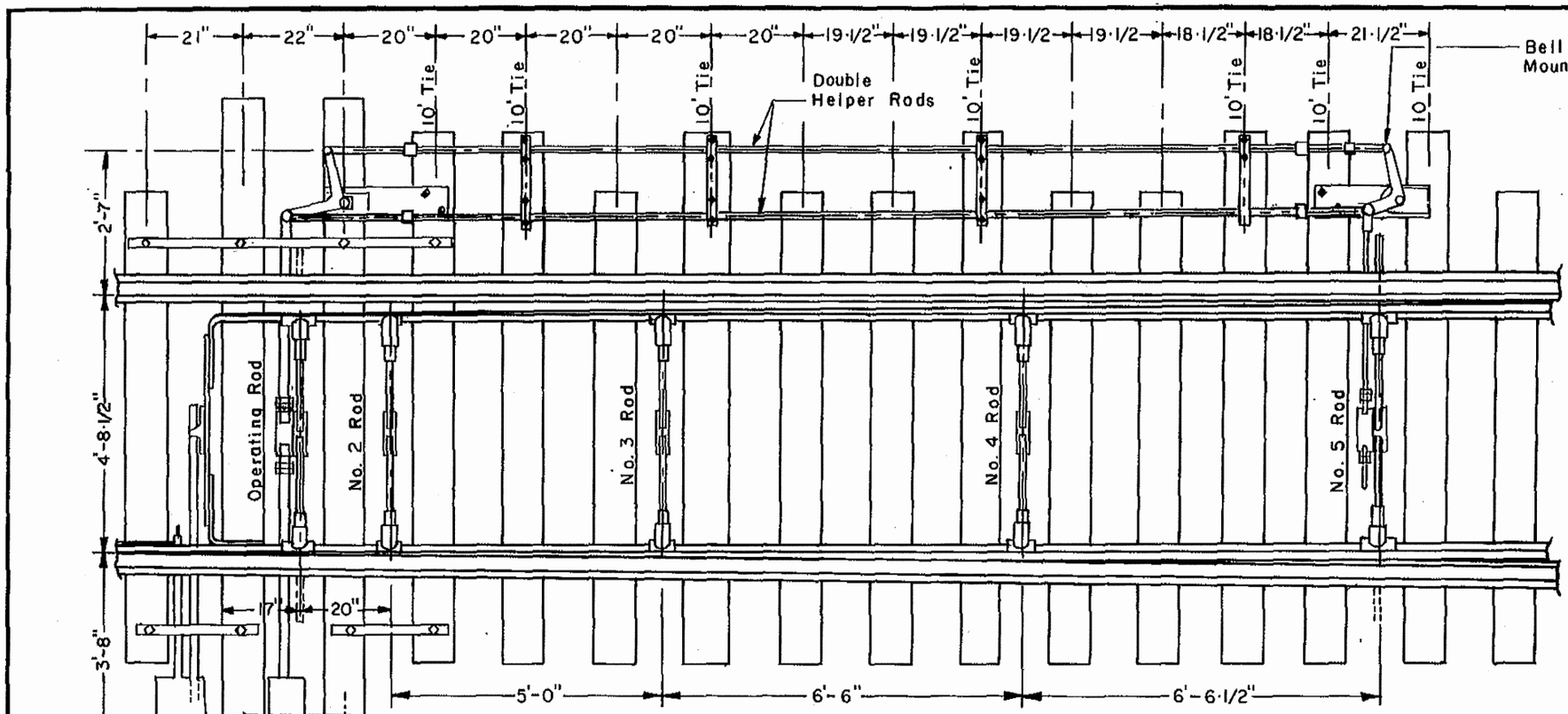
ISSUE DATE ISSUE NO.

VERTICAL SWITCH RODS AND ADJUSTABLE ROCKER CLIPS

FOR 39'-0" SWITCH-115 LB. OR 132 LB. R.E. RAIL

John P. Ray
ENGINEERING OFFICER

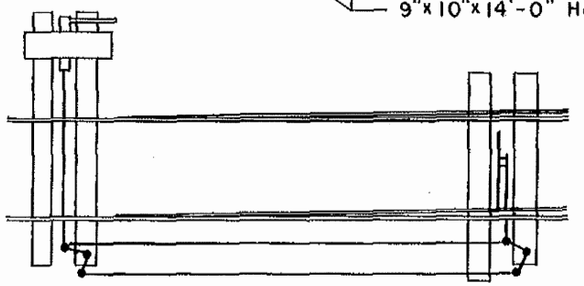
W. A. Wood
CHIEF ENGINEERING OFFICER



TYPICAL RIGHT HAND LAYOUT

NOTE:

Helper layout is used only with 39'-0" switch (No. 20 Turnout)



TYPICAL LEFT HAND LAYOUT

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 2209

Apr. 29,1996 ISSUE DATE

3 ISSUE NO.

TYPICAL POWER SWITCH LAYOUT WITH HELPER

John D. Ray

SECTION CHIEF

NO. 20 TURNOUT WITH FLOATING HEEL BLOCKS - BILL OF MATERIAL

QUANTITY	DESCRIPTION	REFERENCE PLAN NO.
1*	PAIR 59'-6" CURVED SWITCH POINTS COMPLETE WITH REINFORCING BARS, CLIPS AND STOPS ATTACHED.	2215
2	FLOATING HEEL BLOCKS	2350
2	60'-0" UNDERCUT STOCK RAILS	2360
3	INSULATED GAGE PLATES (NO. 0G, 1G, & 2G)	2207
16	NO. 1 ADJUSTABLE BRACE SLIDE PLATES	2207
26	NO. 1P SHOULDER SLIDES PLATES	2207
4	NO. HP HEEL PLATES	2207
6	SWITCH RAIL STOPS	2350
12	ADJUSTABLE ROCKER CLIPS FOR VERTICAL SWITCH RODS	2208
6	INSULATED VERTICAL SWITCH RODS (NO. 1, 2, 3, 4, 5, & 6)	2208
40*	TURNOUT PLATES FOR USE BEHIND HEEL OF SWITCH (NO. 20-2 R/L TO 20-8 R/L & 20-9 TO 20-21)x2	2343
22	RESILIENTLY FASTENED ADJUSTABLE RAIL BRACE	2352
1	NO. 20 RAILBOUND MANGANESE STEEL FROG, COMPLETE	2206
20	NO. P27 SELF ALIGNING SHOULDER TIE PLATE	2328
28	NO. P31 SELF ALIGNING SHOULDER TIE PLATE	2328
10	NO. PR27 SELF ALIGNING SHOULDER TIE PLATE	2328
2	NO. PR31 SELF ALIGNING SHOULDER TIE PLATE	2328
2	13'-3" MANGANESE STEEL ONE PIECE GUARD RAILS	2302
2	19'-6" BONDED INSULATED JOINT PLUG RAIL	1340
3	78'-0" LENGTHS OF FULLY HEAT TREATED RAIL	-
4	39'-0" LENGTHS OF FULLY HEAT TREATED RAIL	-
1 EA.+	VARIOUS LENGTHS OF FULLY HEAT TREATED RAIL AS FOLLOWS: 42'-11½", 37'-4", 25'-1½"	-
1744	¾" SCREW SPIKES	1218
78**	¾" x 6" TRACK DRIVE SPIKES	1217
838	RESILIENT FASTENER SPRING CLIPS - TYPE "E"	-
8	RESILIENT FASTENER SPRING CLIPS - TYPE MODIFIED "E"	-
286	RESILIENT FASTENER TIE PLATES FOR SCREW SPIKES	1225
14	1:80 CANT TRANSITION TIE PLATES	2348
20	STANDARD JOINT BAR ASSEMBLIES	1322
80	STANDARD TRACK BOLTS WITH NUTS & WASHERS	1332
1	HELPER LAYOUT	2209

* THESE ITEMS SHALL BE SUPPLIED FOR R.H., L.H. OR EQUILATERAL TURNOUT, AS REQUIRED
+ FOR EQUILATERAL TURNOUTS, CLOSURE RAILS HAVE SLIGHTLY DIFFERENT LENGTHS
** SUPPLIED BY THE INSTALLER

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

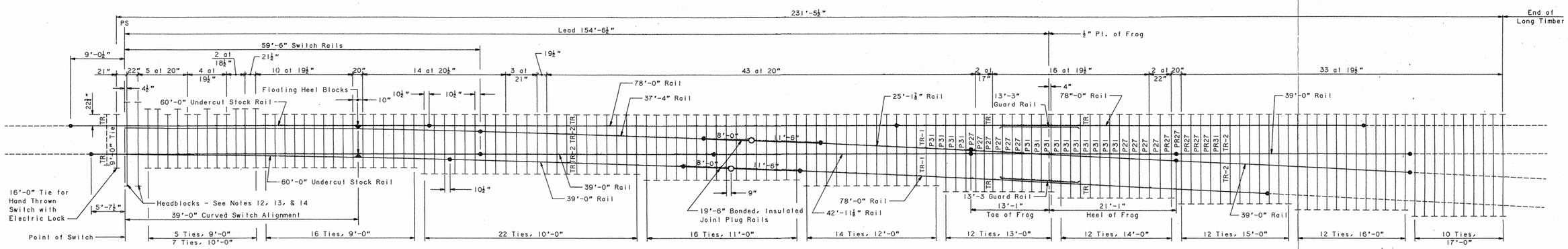
RAILROAD OPERATIONS

DWG. NO. 2210

APR. 29, 1996 (3)
ISSUE DATE ISSUE NO.

NO. 20 FLOATING HEEL BLOCK TURNOUT
BILL OF MATERIAL

John D. Rang
SECTION CHIEF



NOTES

1-Stock rails, switch points and all rails furnished to be fully heat treated.
2-Switch Points per AREA Detail 5100 as shown on Plan 2205.
3-60' stock rails to be undercut as per Plan 2360.
4-For switch details see Plan 2215.
5-Gage plates No. 0G, 1G & 2G as per Plan 2207.
6-Switch plates Nos. 1, 1P and HP as per Plan 2207.
7-Turnout plates, No. 2 thru No. 21, as per Plan 2343.
8-Vertical insulated switch rods and adjustable rocker clips, as per Plan 2208.
9-Floating Heel block as per Plan 2350.
10-All rails to be drilled as shown on this plan, except that first hole is not to be drilled by the manufacturer. Installer to field drill first hole when necessary.
11-All tie plates to be resiliently fastened except guard rails.
12-Two 9"x10"x13' Headblocks needed with switch stand 3' high or less, 16' long with stands over 3'.
13-Three 9"x10"x16' Headblocks needed for hand thrown switch with electric lock.
14-Two 9"x10"x14' Headblocks needed for power operated switch.
15-See Plan 2210 for Bill of Material.
16-Rail lengths are computed to allow a ¼" gap for temporarily bolting the field welded joints and ⅜" gap for insulated joints. When rails are welded in the field, they must be cut to provide gaps recommended by the weld kit manufacturer.
17-Transition Plates (TR) 1:80 Cant, as per Plan 2348.

LEGEND

- Indicates rails furnished by the manufacturer.
- Indicates rails furnished by the Installer.
- Indicates "floating" heel blocks..
- Indicates insulated joints with 3/16" opening.
- Indicates joints to be field welded.
- Indicates Bonded Insulated Joint Plug Rail

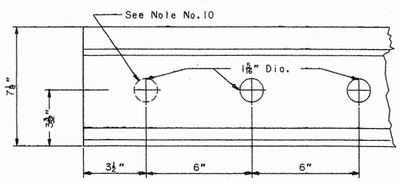
FROG TIE PLATES

20 - P27 SAS (self-aligning shoulder)
28 - P31 SAS
10 - PR27 SAS
2 - PR31 SAS

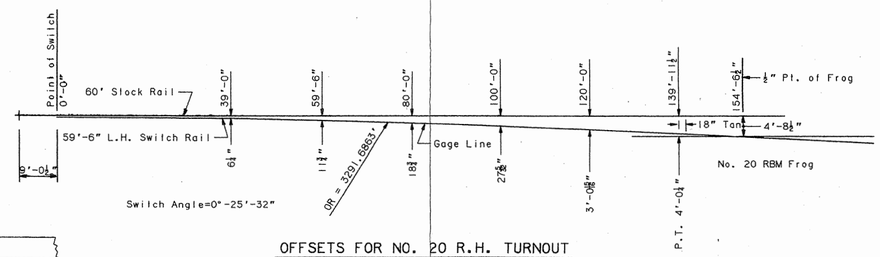
LONG TIMBERS REQUIRED

Quantity	Length
22	9'-0"
29	10'-0"
16	11'-0"
12	12'-0"
12	13'-0"
14	14'-0"
12	15'-0"
12	16'-0"
10	17'-0"
139	Total

Headblocks are not shown in table see notes 12, 13 & 14



RAIL END DRILLING



OFFSETS FOR NO. 20 R.H. TURNOUT

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

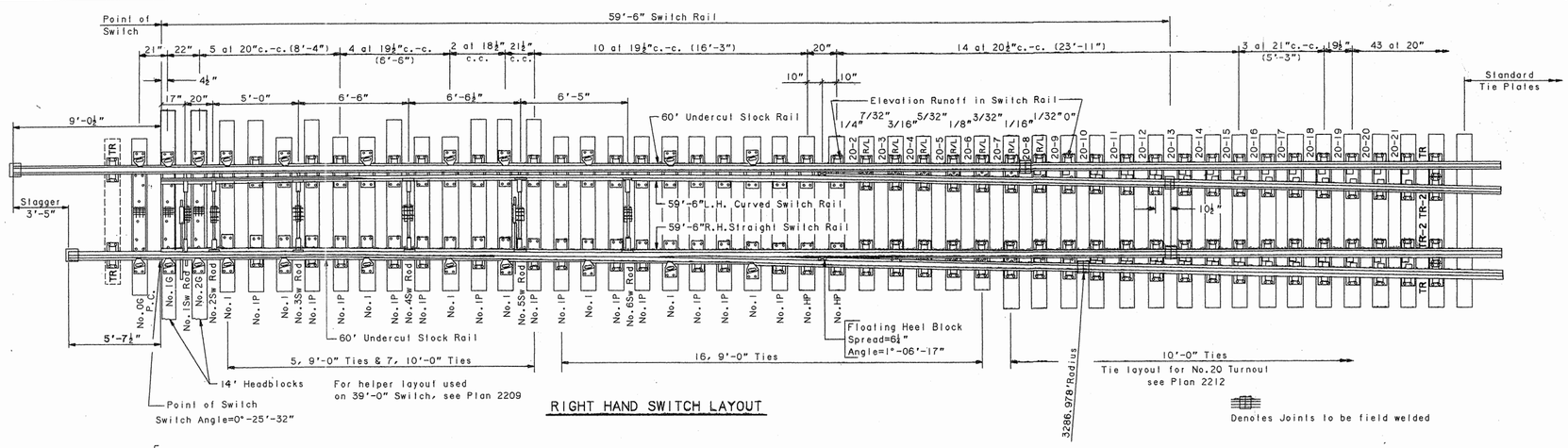
RAILROAD OPERATIONS

DWG. NO. 2212

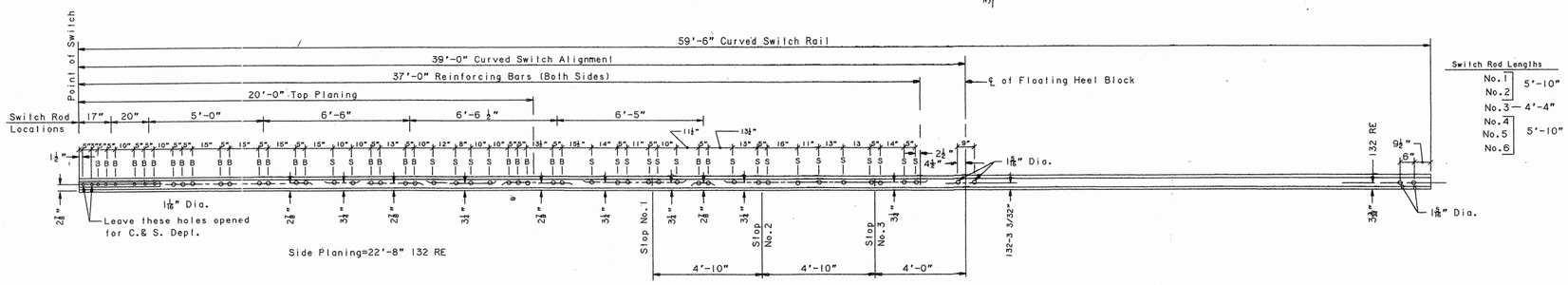
Apr. 29, 1996 (ISSUE DATE) (3) (ISSUE NO.)

NO. 20 TURNOUT WITH FLOATING HEEL BLOCKS - TIE & RAIL LAYOUT

SECTION CHIEF


Point of Switch
59'-6" Switch Rail
21" 22" 5 at 20"c.-c.(8'-4") 4 at 19½"c.-c. (6'-6") 2 at 18½" 21½" c.c. c.c. 10 at 19½"c.-c. (16'-3") 20" 14 at 20½"c.-c. (23'-11") 3 at 21"c.-c. (5'-3") 19½" 43 at 20"
4½"
17" 20" 5'-0" 6'-6" 6'-6½" 6'-5"
10" 10"
Standard Tie Plates
9'-0½"
Elevation Runoff in Switch Rail
1/4" 7/32" 3/16" 5/32" 1/8" 3/32" 1/16" 1/32" 0"
60' Undercut Stock Rail
Slagger 3'-5"
59'-6"L.H. Curved Switch Rail
59'-6"R.H.Straight Switch Rail
10½"
No.0 P.L.
No.1 Sw Rod
No.2 Sw Rod
No.2 Sw Rod
No.3 Sw Rod
No.4 Sw Rod
No.5 Sw Rod
No.6 Sw Rod
No.1 No.1P No.1 No.1 No.1P No.1 No.1P No.1 No.1P No.1 No.1P No.1 No.1P No.1 No.1P No.1 No.1P No.1 No.1P No.1 No.1P No.1 No.1P No.HP No.HP
TR
TR-2
60' Undercut Stock Rail
Floating Heel Block Spread=6½" Angle=1°-06'-17"
5'-7½"
5, 9'-0" Ties & 7, 10'-0" Ties
16, 9'-0" Ties
10'-0" Ties
Tie layout for No.20 Turnout see Plan 2212
14' Headblocks
For helper layout used on 39'-0" Switch, see Plan 2209
Point of Switch
Switch Angle=0°-25'-32"
3286.978' Radius
Denotes Joints to be field welded

RIGHT HAND SWITCH LAYOUT



Switch Rod Lengths

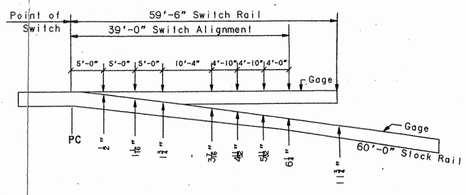
No.1	5'-10"
No.2	
No.3	4'-4"
No.4	
No.5	5'-10"
No.6	

"B"=1" Dia. H.T. machine bolts with square nuts, spring washers and ¼" cotter pins. Hex nuts at rocker clips.
"S"=¾" machine bolts for slops with square nuts, spring washers and ⅝" cotter pins.

ELEVATION OF SWITCH RAIL

NOTES

1. - This plan is for use with A.R.E.A. recommended standards for 132 RE
2. - Workmanship and materials shall be per current A.R.E.A. Specifications.
3. - Gage Plates 0-G, 1-G and 2-G as shown on Plan 2207.
4. - Switch Plates No. 1, No. 1p and No. HP as shown on Plan 2207.
5. - Turnout Plates No. 2 thru No. 21 as shown on Plan 2343.
6. - Slock Rails to be undercut as shown on Plan 2360.
7. - Switch Rails to be undercut per A.R.E.A. Design 5100.
8. - All rails to be Fully Heat Treated.
9. - Vertical insulated switch rods and adjustable rocker clips as per Plan 2208.
10. - All rails, including switch rails, to be drilled by the manufacturer, except first hole to be left blank. Installer to drill first hole when necessary.
11. - See Plan 2110 for Bill of Material.
12. - All bolts shall be dipped in a non-oxidizing grease immediately before applying so that all threads are thoroughly coated.



SWITCH OFFSETS

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

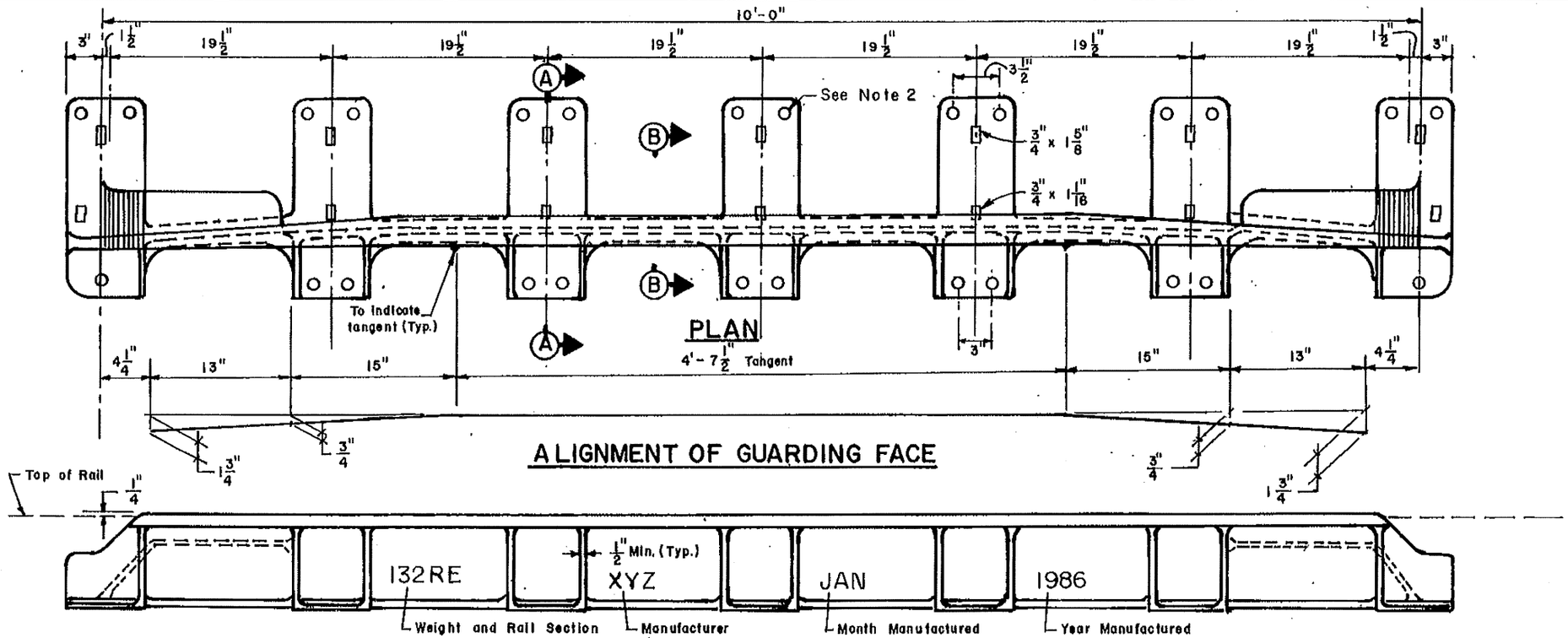
DWG. NO. 2215

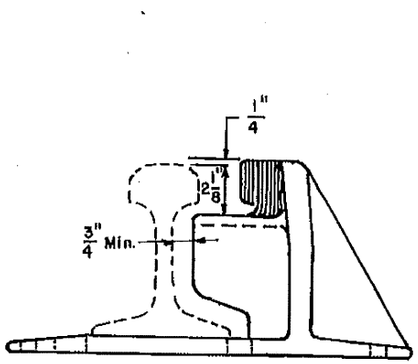
Apr. 29, 1996 ISSUE DATE

3 ISSUE NO.

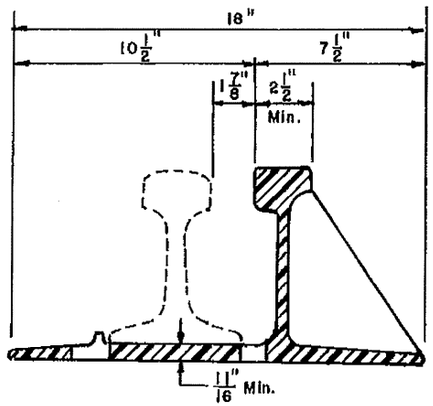
39' CURVED SPLIT SWITCH WITH FLOATING HEEL BLOCKS

SECTION CHIEF

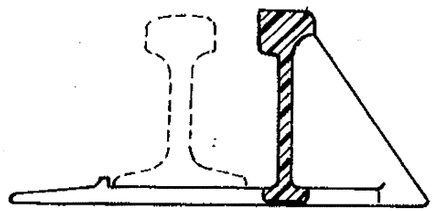




END ELEVATION



SECTION A-A



SECTION B-B

NOTES:

1. For details of setting guard rail, see Plan 2310.
2. Furnish with 15/16" diameter holes.

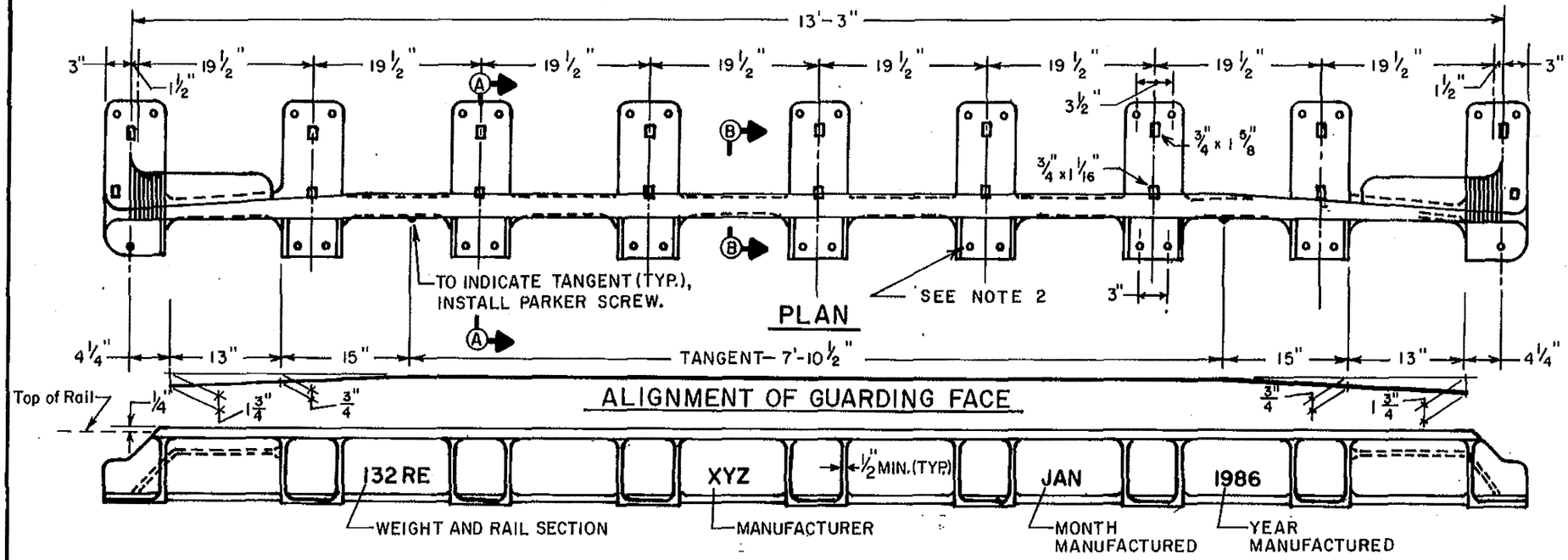
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY | RAILROAD OPERATIONS | DWG. NO. 2300

Oct. 28, 1992 (2)
ISSUE DATE ISSUE NO.

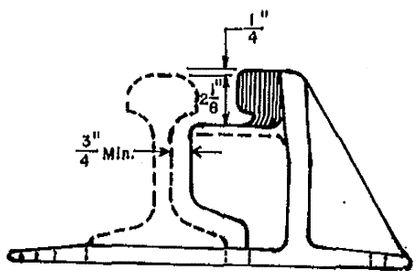
10'-0" MANGANESE STEEL ONE PIECE GUARD RAIL

John D. Ray
ENGINEERING OFFICER

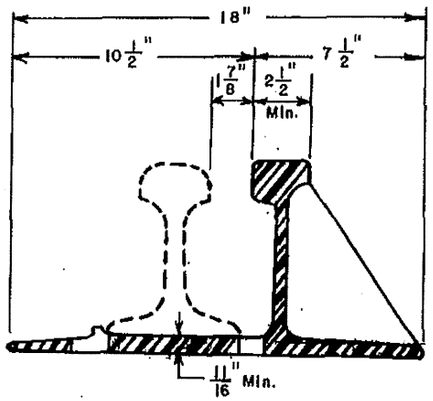
CHIEF ENGINEERING OFFICER



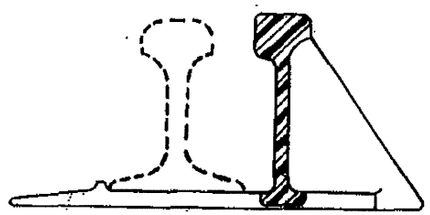
13'-3" ONE PIECE MANGANESE STEEL GUARD RAIL



END ELEVATION



SECTION A-A



SECTION B-B

NOTES:

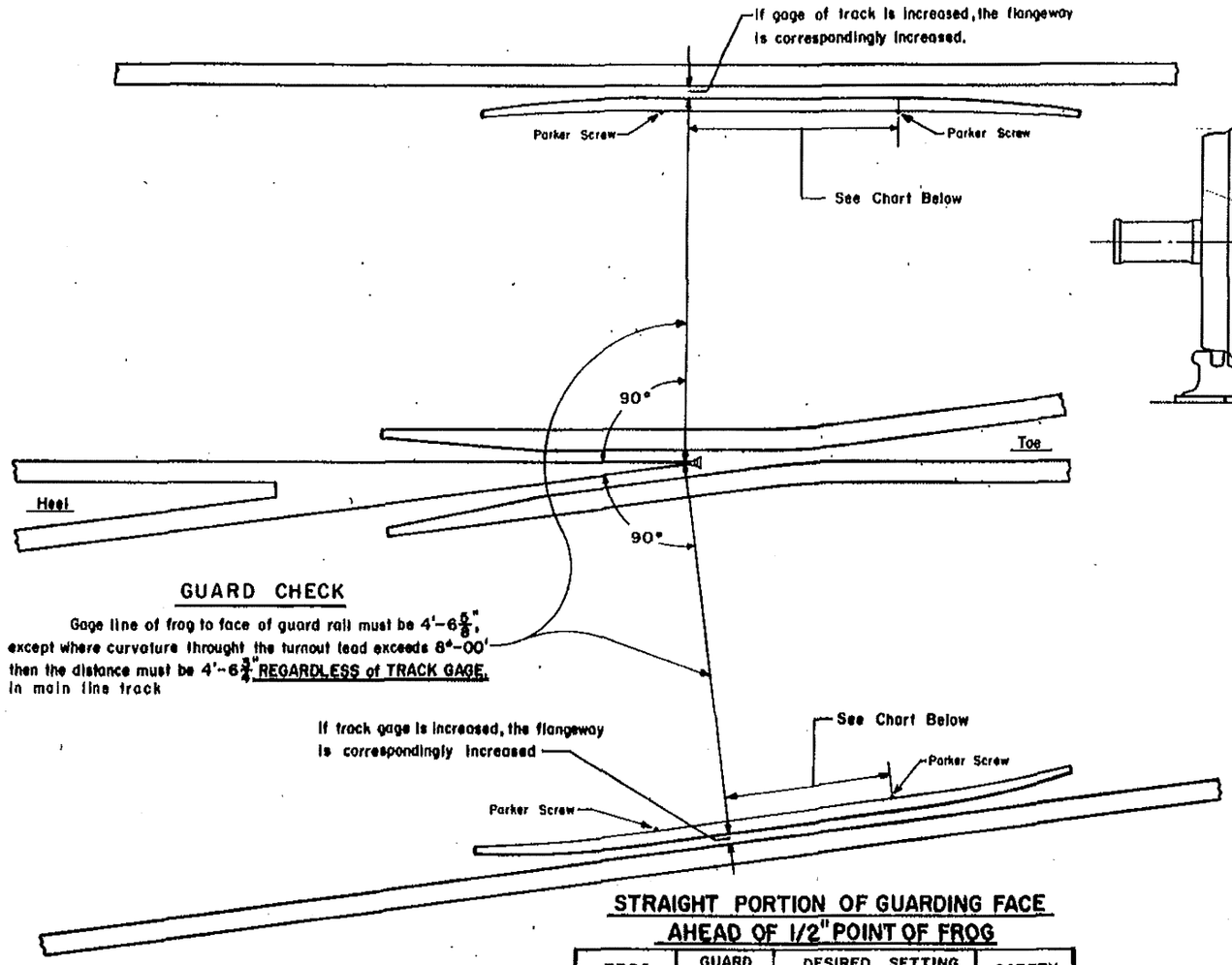
1. For details of setting guard rail, see Plan 2310.
2. Furnish with 15/16" diameter holes.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2302
		Oct. 28, 1992 (ISSUE DATE) (1) (ISSUE NO.)

13'-3" MANGANESE STEEL ONE PIECE GUARD RAIL

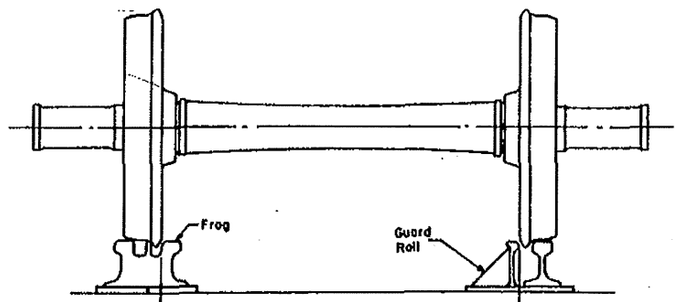
John D. Ray — ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



GUARD CHECK

Gage line of frog to face of guard rail must be $4'-6\frac{5}{8}"$, except where curvature throught the turnout lead exceeds $8°-00'$ then the distance must be $4'-6\frac{3}{4}"$ REGARDLESS of TRACK GAGE, in main line track



GUARD FACE

Distance, gage line of wing rail of frog to face of guard rail must not exceed $4'-5"$ in main line track

NOTES

1 – Guard rails must conform to MBTA Specifications for one piece manganese steel guard rails.

2 – Each tie bearing portion of the guard rails must be fully supported by a tie, which shall be kept well tamped at all times.

3 – For details of guard rails see Plan No. 2300 & 2302.

4 – Parker Screws on the back of the guard rail indicates the extent of the straight portion of the guarding face.

5 – For Additional data, See MW-1 Manual – Section 213.143

STRAIGHT PORTION OF GUARDING FACE AHEAD OF 1/2" POINT OF FROG

FROG NO.	GUARD RAIL LENGTH	DESIRED SETTING (BASED ON TIE & RAIL LAYOUT PLANS IN BOOK)	SAFETY MINIMUM
6	10'-0"		22"
8	10'-0"	$3'-7\frac{1}{4}"$	22"
10	13'-3"	$4'-3\frac{1}{4}"$	22"
15	13'-3"	$5'-2\frac{3}{4}"$	22"
20	13'-3"	$5'-2\frac{3}{4}"$	36"

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 2310

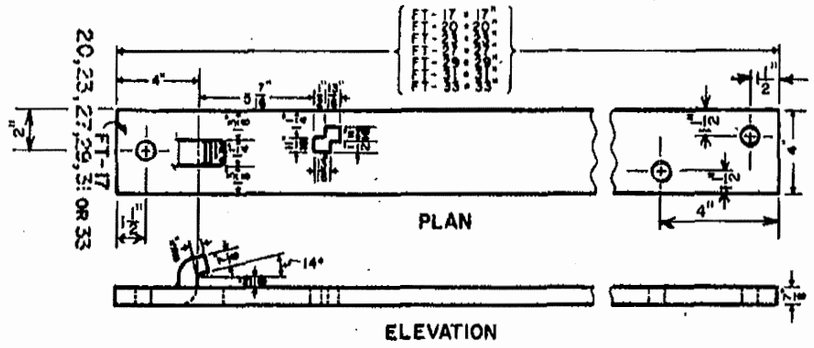
Oct. 28, 1992 (2)

ISSUE DATE ISSUE NO.

GUARD RAIL INSTALLATION AND MAINTENANCE

John D. Ray
ENGINEERING OFFICER

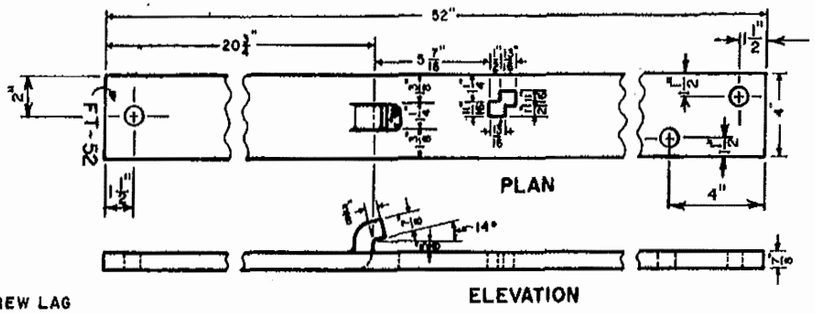
CHIEF ENGINEERING OFFICER



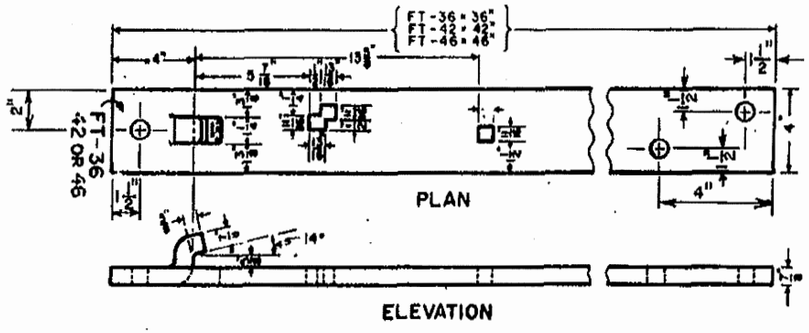
FT PLATE

NOTE:

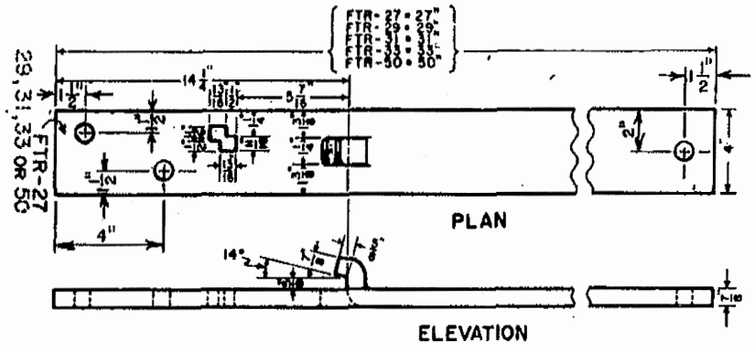
ALL PLATE HOLDING SCREW LAG HOLES ARE 15/16" DIA.



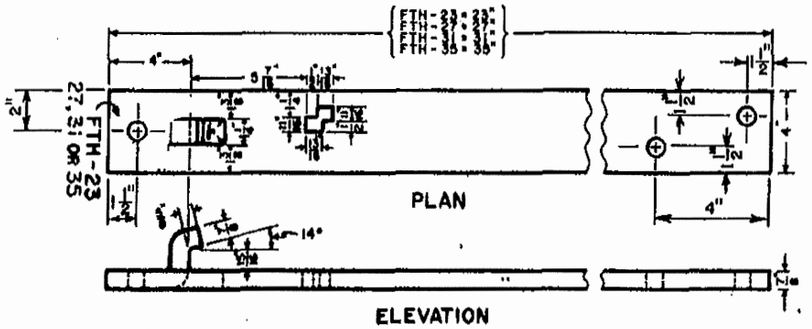
FT-52 PLATE



FT PLATE



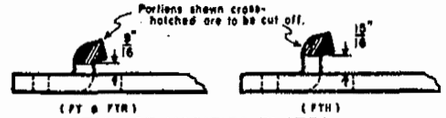
FTR PLATE



FTH PLATE

PLATE DESIGNATION

FT = Frog Tie Plate
FTH = Frog Tie Plate (High Hook)
FTR = Frog Tie Plate (Reverse Hook)
FT-MOD., FTH-MOD., FTR-MOD. } Modified plates will have the hook cut back as detailed below.



DETAIL OF MODIFIED PLATES

Note

Where hook on Frog Tie Plate will impinge upon base of frog or base of joint bar, the Frog Tie Plate must be modified as detailed.

NOTES

Plates shall conform to the current A.R.E.A. Specifications for Low-Carbon Steel Tie Plates, with copper.

Each plate shall be marked by deeply cut characters, not less than one half inch high, in the position as indicated on this plan, with the plate designation as shown.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 2326

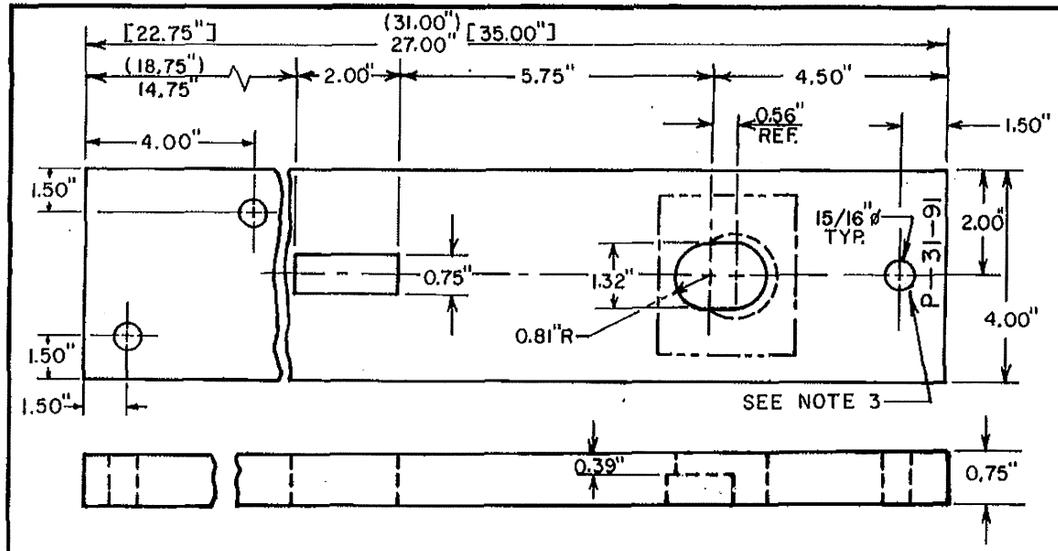
Oct. 28, 1992 (2)

ISSUE DATE ISSUE NO.

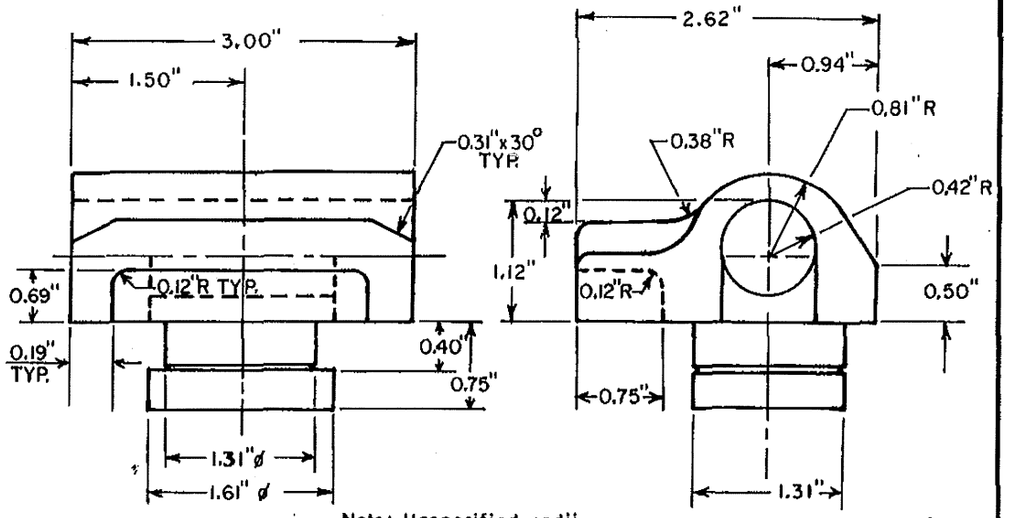
FROG TIE PLATES
RAILBOUND MANGANESE FROG

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER

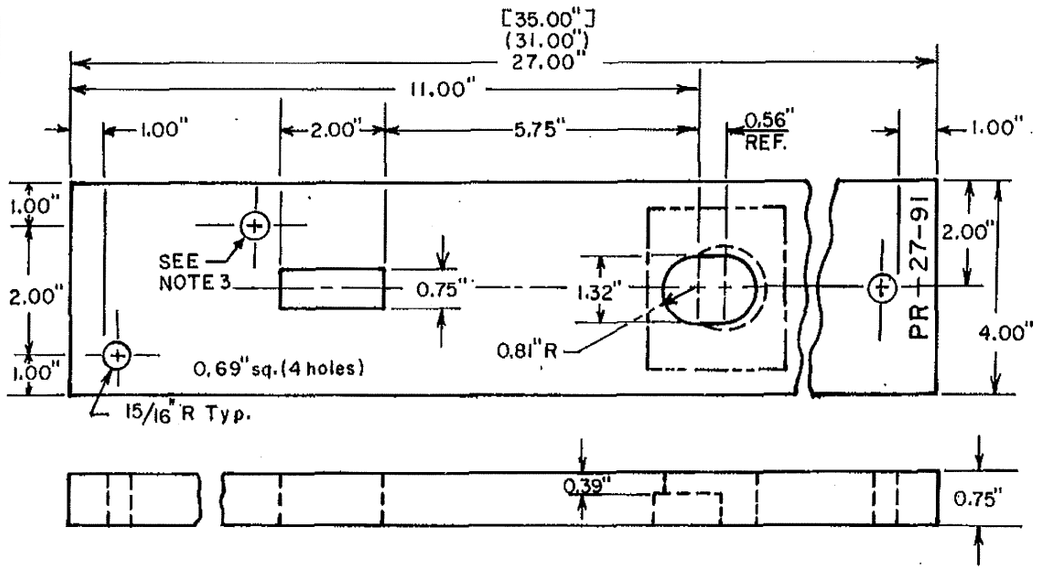


NORMAL FROG PLATE



Note: Unspecified radii to be 0.06" max.

SWIVEL SHOULDER INSERT



REVERSE FROG PLATE

NOTES:

1. Plates shown are manufactured by PANDROL, INC.
2. Material shall be Low-Carbon Steel and the plates shall conform to current A.R.E.A. specifications.
3. Furnish plates with 15/16" diameter holes for screw lags.
4. Tie plates shall be branded with a letter to designate the manufacturer, the letter 'R' when the plate is reverse shoulder, two numbers indicating the length (27", 31" or 35"), and the last two digits of the year manufactured.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

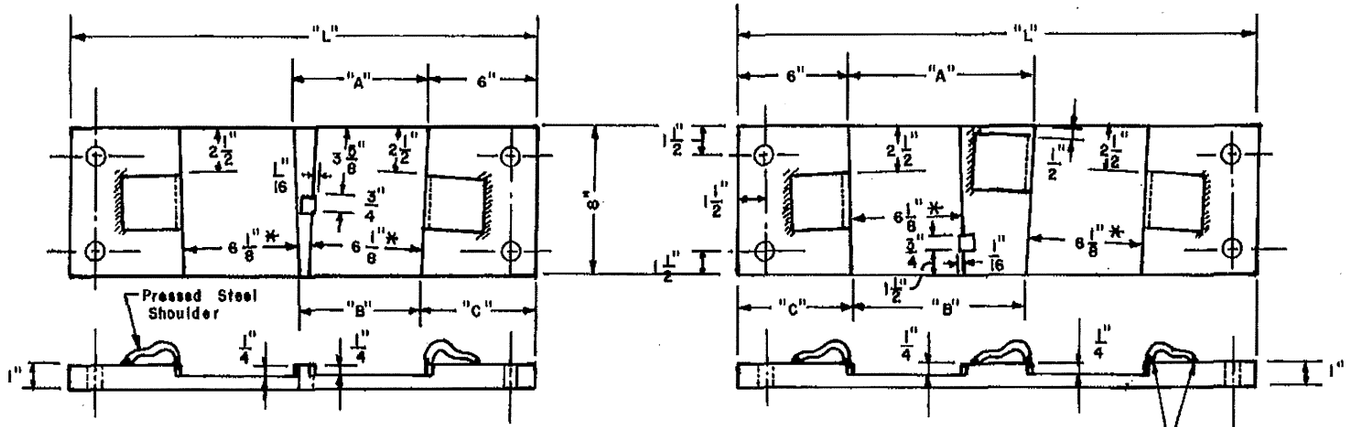
RAILROAD OPERATIONS

DWG. NO. 2328

Jan. 5, 1996 (2)
ISSUE DATE ISSUE NO.

SELF-ALIGNING SHOULDER TIE PLATES

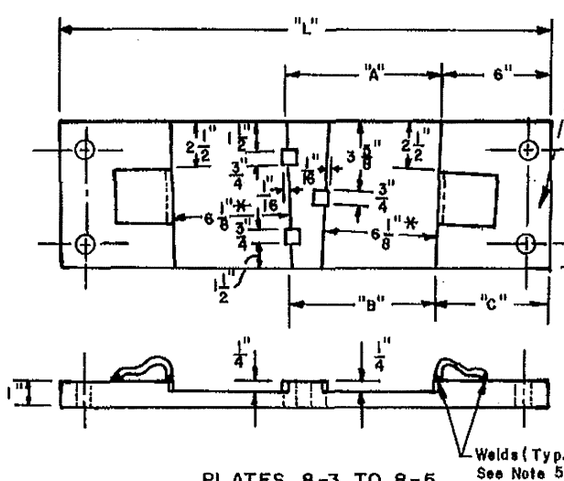
John D. Ray
SECTION CHIEF



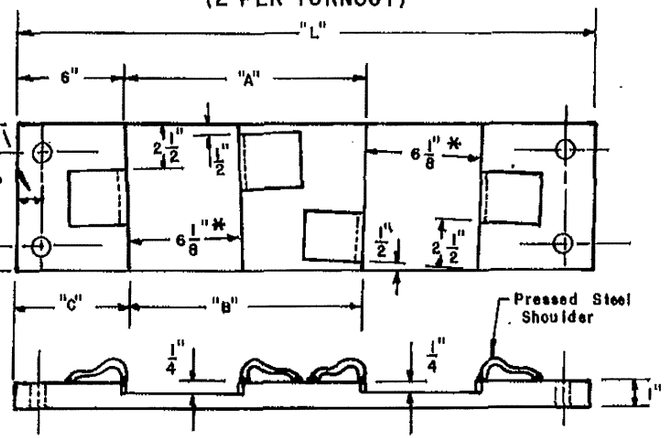
PLATES 8-2, 10-2, 15-2 & 20-2
(2 PER TURNOUT)

PLATE 8-6
PLATE 10-6
PLATES 15-6 & 15-7
PLATES 20-9 & 20-10
(2 PER TURNOUT)

Mark Plate Designation on Alternate Ends of Plates so that it will always be on the Field Side



PLATES 8-3 TO 8-5
PLATES 10-3 TO 10-5
PLATES 15-3 TO 15-5
PLATES 20-3 TO 20-8
(2 PER TURNOUT)



PLATES 8-7 TO 8-11
PLATES 10-7 TO 10-12
PLATES 15-8 TO 15-14
PLATES 20-11 TO 20-21
(2 PER TURNOUT)

$*6\frac{1}{8}$" for 132 RE rail, $5\frac{5}{8}$" for 115 RE rail.

NOTES:

1. First number in plate designation is turnout frog number, second is number of ties from heel block which counts as one.
2. Switch plates shall conform to current AREA specifications, Low-Carbon Steel Tie Plates with Copper.
3. Round holes for plate holding screw lags are 15/16" dia.
4. Rectangular holes for track spikes are 3/4" x 13/16" with 1/16" under the rail base.
5. Welds shall not interfere with the application of the resilient fasteners. Welds shall be full penetration groove welds.
6. Plates shown are for a graduated riser turnout only.
7. Variable dimensions A, B, C & L are shown on the following plan (No. 2341).
8. Each plate shall be marked with deeply cut characters not less than $\frac{1}{2}$" high, in the positions indicated on this plan.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 2340

Oct. 28, 1992 (2)
ISSUE DATE ISSUE NO.

RESILIENTLY FASTENED TURNOUT PLATES

NUMBER 8, 10, 15, 20 TURNOUTS
FOR USE BEHIND HEEL OF SWITCH WITH GRADUATED RISERS

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER

NO. 8 TURNOUT				
Plate No.	A	B	C	L
8 – 2	7 5/16"	7 1/32"	6 1/8"	25 1/2"
8 – 3	7 31/32"	7 11/16"	6 1/8"	26"
8 – 4	8 21/32"	8 3/8"	6 5/32"	27"
8 – 5	9 15/32"	9 1/8"	6 5/32"	27 1/2"
8 – 6	10 5/16"	9 31/32"	6 3/16"	29"
8 – 7	11 1/4"	10 7/8"	6 3/16"	29 1/2"
8 – 8	12 1/4"	11 27/32"	6 3/16"	30 1/2"
8 – 9	13 5/16"	12 7/8"	6 7/32"	31 1/2"
8 – 10	14 15/32"	14"	6 7/32"	32 1/2"
8 – 11	15 11/16"	15 3/16"	6 1/4"	34"

NO. 10 TURNOUT				
Plate No.	A	B	C	L
10 – 2	7 5/16"	7 1/16"	6 1/8"	25 1/2"
10 – 3	7 15/16"	7 11/16"	6 1/8"	26"
10 – 4	8 5/8"	8 11/32"	6 1/8"	27"
10 – 5	9 11/32"	9 1/32"	6 5/32"	27 1/2"
10 – 6	10 3/32"	9 25/32"	6 5/32"	28 1/2"
10 – 7	10 29/32"	10 9/16"	6 5/32"	29"
10 – 8	11 25/32"	11 13/32"	6 3/16"	30"
10 – 9	12 21/32"	12 9/32"	6 3/16"	31"
10 – 10	13 5/8"	13 7/32"	6 3/16"	32"
10 – 11	14 19/32"	14 3/16"	6 3/16"	33"
10 – 12	15 5/8"	15 7/32"	6 7/32"	33 1/2"

NO. 15 TURNOUT				
Plate No.	A	B	C	L
15 – 2	7 7/32"	6 31/32"	6 1/8"	25 1/2"
15 – 3	7 25/32"	7 9/16"	6 1/8"	26"
15 – 4	8 3/8"	8 5/32"	6 1/8"	26 1/2"
15 – 5	9"	8 3/4"	6 1/8"	27"
15 – 6	9 5/8"	9 3/8"	6 1/8"	28"
15 – 7	10 5/16"	10 1/32"	6 1/8"	28 1/2"
15 – 8	10 31/32"	10 11/16"	6 1/8"	29"
15 – 9	11 21/32"	11 3/8"	6 1/8"	30"
15 – 10	12 3/8"	12 1/16"	6 5/32"	30 1/2"
15 – 11	13 3/32"	12 25/32"	6 5/32"	31 1/2"
15 – 12	13 27/32"	13 17/32"	6 5/32"	32"
15 – 13	14 19/32"	14 9/32"	6 5/32"	33"
15 – 14	15 3/8"	15 1/16"	6 5/32"	33 1/2"

NO. 20 TURNOUT				
Plate No.	A	B	C	L
20 – 2	6 29/32"	6 3/4"	6 3/32"	25"
20 – 3	7 5/16"	7 5/32"	6 3/32"	25 1/2"
20 – 4	7 23/32"	7 9/16"	6 3/32"	26"
20 – 5	8 1/8"	7 31/32"	6 3/32"	26 1/2"
20 – 6	8 9/16"	8 3/8"	6 3/32"	27"
20 – 7	9"	8 13/16"	6 3/32"	27 1/2"
20 – 8	9 7/16"	9 1/4"	6 3/32"	27 1/2"
20 – 9	9 29/32"	9 23/32"	6 3/32"	28"
20 – 10	10 3/8"	10 5/32"	6 3/32"	28 1/2"
20 – 11	10 27/32"	10 5/8"	6 3/32"	29"
20 – 12	11 5/16"	11 1/8"	6 3/32"	29 1/2"
20 – 13	11 13/16"	11 19/32"	6 3/32"	30"
20 – 14	12 5/16"	12 3/32"	6 3/32"	30 1/2"
20 – 15	12 13/16"	12 5/8"	6 3/32"	31"
20 – 16	13 11/32"	13 1/8"	6 1/8"	31 1/2"
20 – 17	13 7/8"	13 21/32"	6 1/8"	32"
20 – 18	14 7/16"	14 3/16"	6 1/8"	32 1/2"
20 – 19	14 31/32"	14 3/4"	6 1/8"	33 1/2"
20 – 20	15 9/16"	15 5/16"	6 1/8"	34"
20 – 21	16 1/32"	15 3/4"	6 1/8"	34 1/2"

NOTES

1—See previous plan (No. 2340-II)for diagram showing the location of dimensions A, B, C, & L.

2—Dimensions shown are only for tie spacings shown on corresponding Tie and Rail Layout Plans.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 2341

Oct. 28, 1992 (2)

ISSUE DATE ISSUE NO.

TABLE OF DIMENSIONS FOR RESILIENTLY FASTENED TURNOUT PLATES

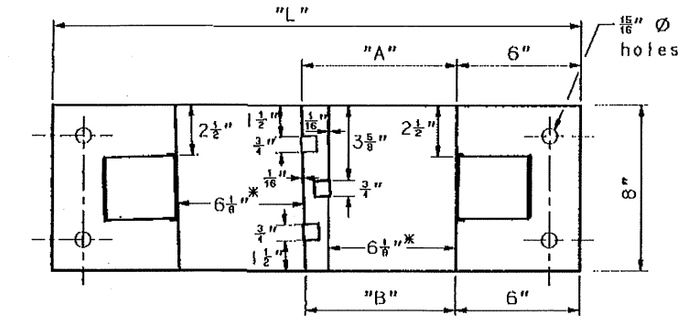
John D. Ray
ENGINEERING OFFICER

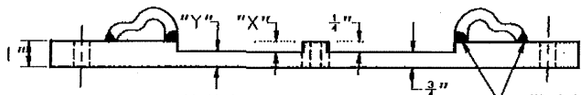
CHIEF ENGINEERING OFFICER

PLATE No.	A	B	X	Y	L
8-2 R/L	$7\frac{15}{32}$"	$7\frac{7}{32}$"	$\frac{1}{16}$"	$\frac{15}{16}$"	$25\frac{1}{2}$"
8-3 R/L	$8\frac{5}{32}$"	$7\frac{7}{8}$"	$\frac{1}{8}$"	$\frac{7}{8}$"	$26\frac{1}{2}$"
8-4 R/L	$8\frac{15}{16}$"	$8\frac{5}{8}$"	$\frac{3}{16}$"	$\frac{13}{16}$"	27"
8-5 R/L	$9\frac{13}{16}$"	$9\frac{15}{32}$"	$\frac{1}{4}$"	$\frac{3}{4}$"	28"
10-2 R/L	$7\frac{11}{32}$"	$7\frac{3}{32}$"	$\frac{1}{16}$"	$\frac{15}{16}$"	$25\frac{1}{2}$"
10-3 R/L	$7\frac{31}{32}$"	$7\frac{3}{4}$"	$\frac{1}{8}$"	$\frac{7}{8}$"	26"
10-4 R/L	$8\frac{3}{4}$"	$8\frac{15}{32}$"	$\frac{3}{16}$"	$\frac{13}{16}$"	27"
10-5 R/L	$9\frac{17}{32}$"	$9\frac{1}{4}$"	$\frac{1}{4}$"	$\frac{3}{4}$"	28"

PLATE No.	A	B	C	L
8-6	$10\frac{3}{4}$"	$9\frac{31}{32}$"	$6\frac{3}{16}$"	29"
8-7	$11\frac{3}{4}$"	$11\frac{11}{32}$"	$6\frac{3}{16}$"	30"
8-8	$12\frac{27}{32}$"	$12\frac{7}{16}$"	$6\frac{3}{16}$"	31"
8-9	$14\frac{1}{32}$"	$13\frac{9}{16}$"	$6\frac{3}{16}$"	$32\frac{1}{2}$"
8-10	$15\frac{9}{32}$"	$14\frac{25}{32}$"	$6\frac{1}{4}$"	$33\frac{1}{2}$"
8-11	$16\frac{7}{16}$"	$16\frac{3}{32}$"	$6\frac{1}{4}$"	35"
10-6	$10\frac{3}{8}$"	$10\frac{1}{16}$"	$6\frac{3}{16}$"	29"
10-7	$11\frac{3}{32}$"	$10\frac{15}{16}$"	$6\frac{3}{16}$"	$29\frac{1}{2}$"
10-8	$12\frac{7}{32}$"	$11\frac{27}{32}$"	$6\frac{3}{16}$"	$30\frac{1}{2}$"
10-9	$13\frac{9}{32}$"	$12\frac{13}{16}$"	$6\frac{3}{16}$"	$31\frac{1}{2}$"
10-10	$14\frac{1}{4}$"	$13\frac{27}{32}$"	$6\frac{3}{16}$"	$32\frac{1}{2}$"
10-11	$15\frac{11}{32}$"	$14\frac{15}{16}$"	$6\frac{3}{16}$"	$33\frac{1}{2}$"
10-12	$16\frac{1}{2}$"	$16\frac{1}{16}$"	$6\frac{3}{16}$"	35"

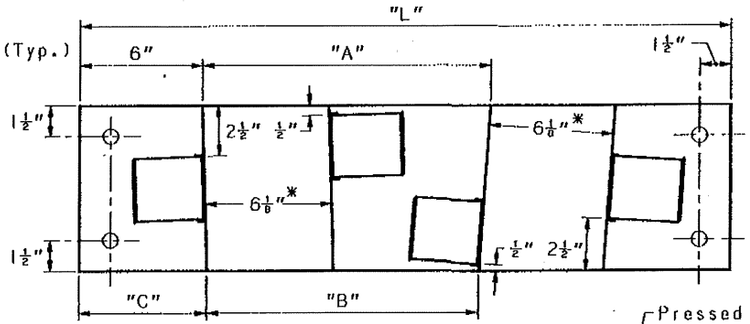
* $6\frac{1}{8}$" for 132 & 136 RE Rail, $5\frac{5}{8}$" for 115 RE Rail.

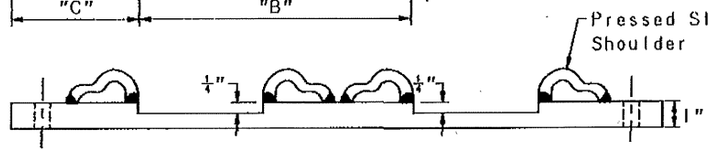




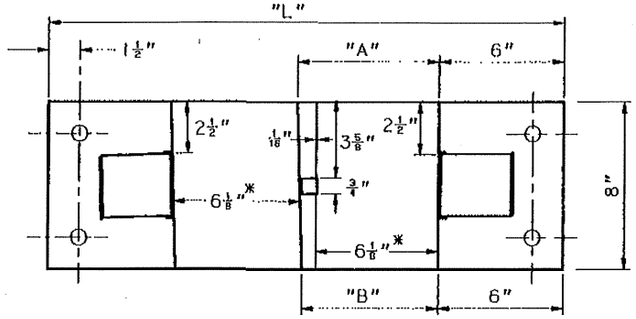
PLATES 8-3R/L TO 8-5R/L
PLATES 10-3R/L TO 10-5R/L

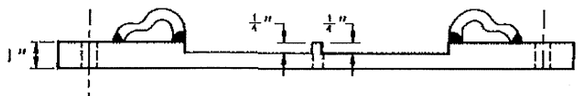
Welds (Typ.), See Note 5



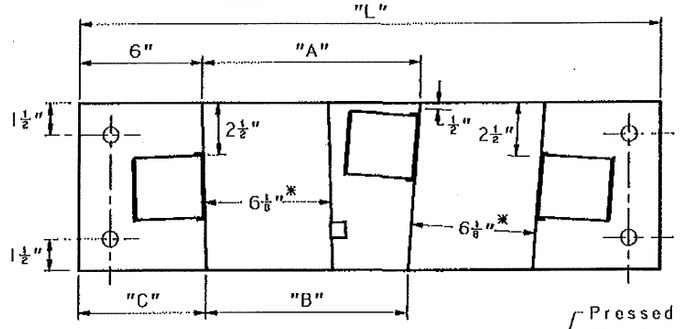


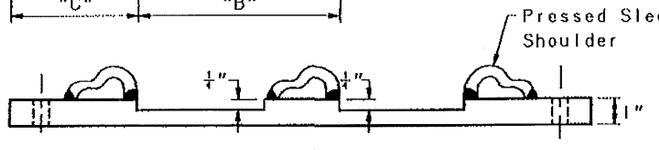
PLATES 8-7 TO 8-11
PLATES 10-7 TO 10-12





PLATES 8-2R/L & 10-2R/L





PLATES 8-6 & 10-6

Notes:

1. Plates 8-2R/L to 8-5R/L and 10-2R/L to 10-5R/L have a "hand" and must be fabricated for either a LH or RH turnout.
2. Each plate shall be marked with deeply cut characters not less than $\frac{1}{2}$" high. First number is turnout frog number, second is number of ties from heel block plates which count as one.
3. Switch plates shall conform to A.R.E.A. specifications for low carbon steel plates with copper.
4. Rectangular holes for track spikes are $\frac{3}{4}$"x$\frac{13}{16}$" with $\frac{1}{16}$" under the base of rail.
5. Welds shall be made so as not to interfere with resilient fasteners. Welds shall be full penetration groove welds.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

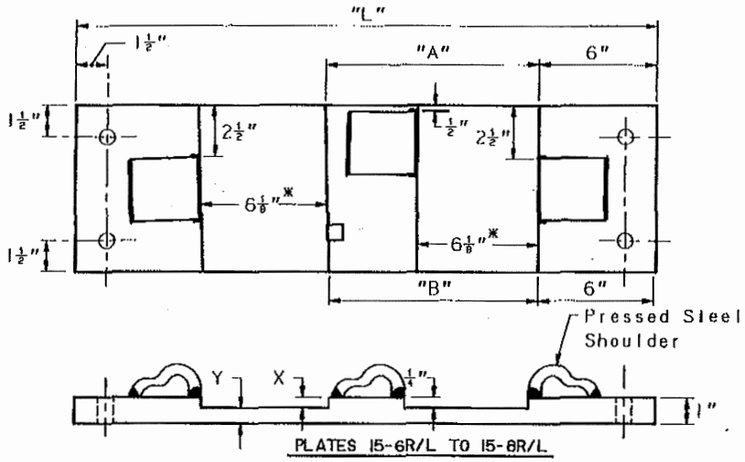
DWG. NO. 2342

JAN. 5, 1996 ISSUE DATE

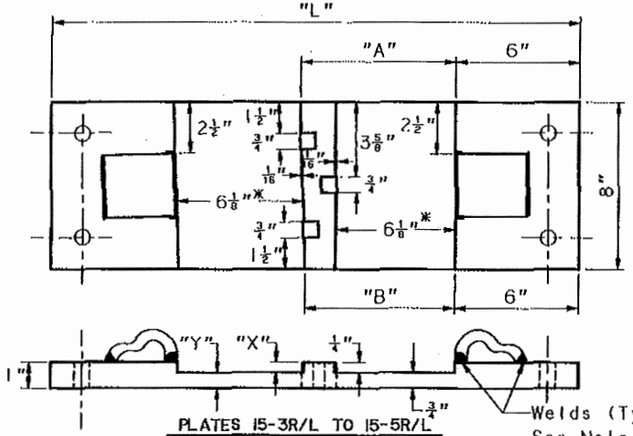
(2) ISSUE NO.

RESILIENTLY FASTENED TURNOUT PLATES NO.8 & 10 FLOATING HEEL BLOCK TURNOUTS

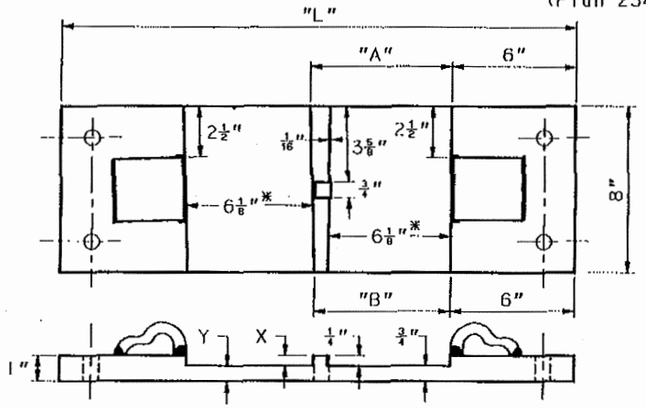
John D. Kay



PLATES 15-6R/L TO 15-8R/L



PLATES 15-3R/L TO 15-5R/L
PLATES 20-3R/L TO 20-8R/L



PLATES 15-2R/L & 20-2R/L

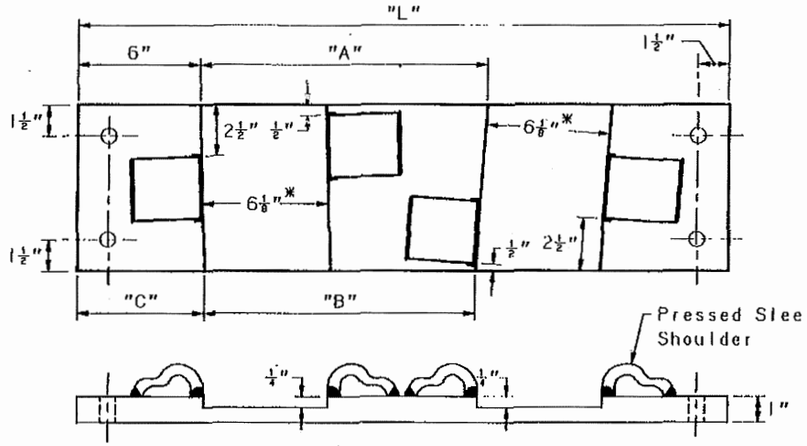
PLATE No.	A	B	X	Y	L
15-2 R/L	7 3/16"	6 31/32"	1/32"	31/32"	25 1/2"
15-3 R/L	7 3/4"	7 17/32"	1/16"	15/16"	26"
15-4 R/L	8 3/8"	8 1/8"	3/32"	29/32"	26 1/2"
15-5 R/L	8 31/32"	8 23/32"	1/8"	7/8"	27 1/2"
15-6 R/L	9 5/8"	9 11/32"	5/32"	27/32"	28"
15-7 R/L	10 1/4"	10"	3/16"	13/16"	28 1/2"
15-8 R/L	10 13/16"	10 21/32"	7/32"	25/32"	29"
20-2 R/L	6 15/16"	6 25/32"	1/32"	31/32"	25 1/2"
20-3 R/L	7 11/32"	7 3/16"	1/16"	15/16"	26"
20-4 R/L	7 25/32"	7 5/8"	3/32"	29/32"	26 1/2"
20-5 R/L	8 7/32"	8 1/16"	1/8"	7/8"	27"
20-6 R/L	8 11/16"	8 1/2"	5/32"	27/32"	27 1/2"
20-7 R/L	9 1/8"	8 15/16"	3/16"	13/16"	27 1/2"
20-8 R/L	9 19/32"	9 13/32"	7/32"	25/32"	28"

PLATE No.	A	B	C	L
15-9	11 5/8"	11 11/32"	6 1/8"	30"
15-10	12 11/32"	12 1/16"	6 5/32"	30 1/2"
15-11	13 3/32"	12 13/16"	6 5/32"	31 1/2"
15-12	13 27/32"	13 9/16"	6 5/32"	32"
15-13	14 5/8"	14 5/16"	6 5/32"	33"
15-14	15 7/16"	14 25/32"	6 5/32"	34"
15-15	16 1/4"	15 15/16"	6 3/16"	34 1/2"
20-9	10 3/32"	9 29/32"	6 3/32"	28 1/2"
20-10	10 19/32"	10 3/8"	6 3/32"	29"
20-11	11 3/32"	10 7/8"	6 3/32"	29 1/2"
20-12	11 19/32"	11 13/32"	6 3/32"	30"
20-13	12 1/8"	11 29/32"	6 3/32"	30 1/2"
20-14	12 21/32"	12 7/16"	6 3/32"	31"
20-15	13 3/16"	13"	6 3/32"	31 1/2"
20-16	13 25/32"	13 9/16"	6 1/8"	32"
20-17	14 3/8"	14 1/8"	6 1/8"	32 1/2"
20-18	14 15/16"	14 25/32"	6 1/8"	33"
20-19	15 1/2"	15 9/32"	6 1/8"	34"
20-20	16 3/32"	15 27/32"	6 1/8"	34 1/2"
20-21	16 11/16"	16 7/16"	6 1/8"	35"

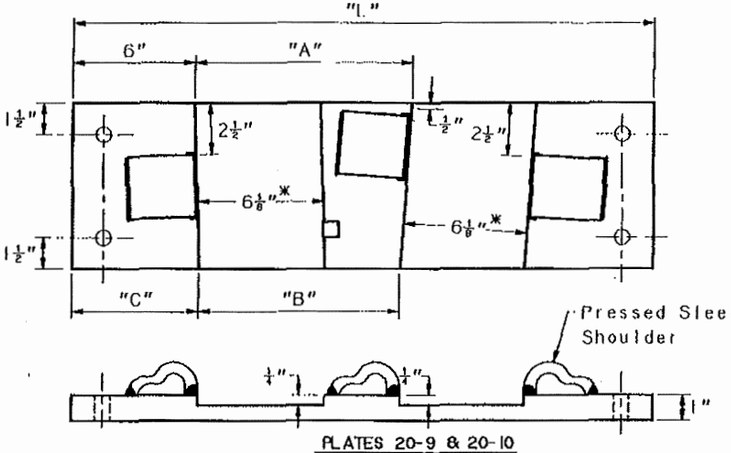
Notes:

1. Plates 15-2R/L to 15-8R/L and 20-2R/L to 20-8R/L have a "hand" and must be fabricated for either a LH or RH turnout.
2. For additional notes, see Plan 2342.

* 6⅛" for 132 & 136 RE Rail, 5⅝" for 115 RE Rail.



PLATES 15-9 TO 15-15
PLATES 20-11 TO 20-21



PLATES 20-9 & 20-10

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

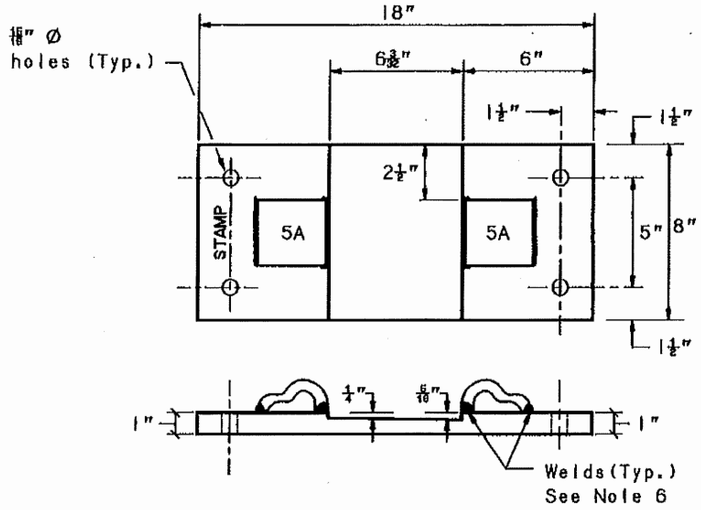
RAILROAD OPERATIONS

DWG. NO. 2343

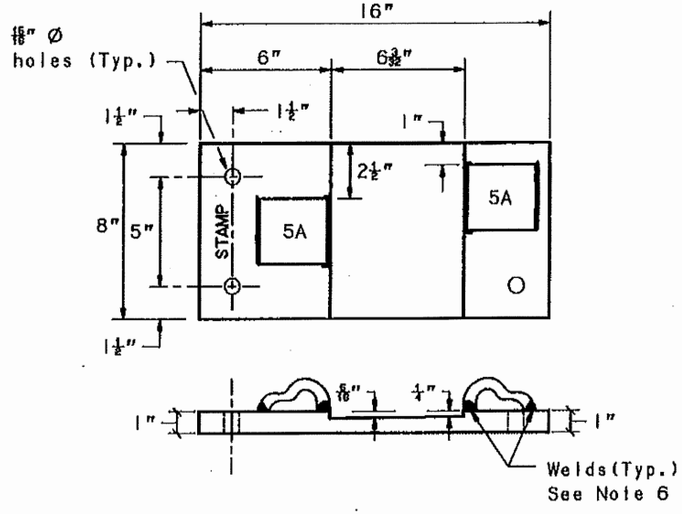
JAN. 5, 1996 (ISSUE DATE) (2) (ISSUE NO.)

RESILIENTLY FASTENED TURNOUT PLATES NO. 15 & 20 FLOATING HEEL BLOCK TURNOUTS

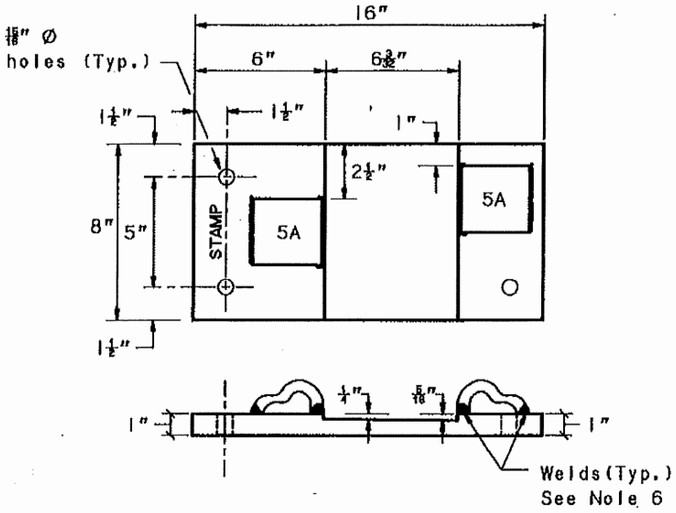
John D. Berg
SECTION CHIEF



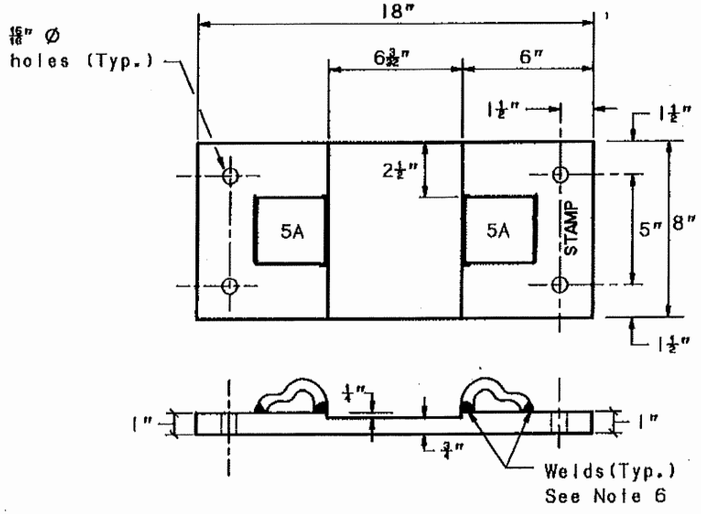
TRANSITION PLATE #TR ~ CANTED 1:80



TRANSITION PLATE #TR-2 ~ CANTED 1:80



TRANSITION PLATE #TR-1 ~ CANTED 1:80



FLAT PLATE #FP

Notes:

1. All plate holding spike holes 15/16" dia.
2. All Pandrol Shoulders Type 2172-5.
3. Rail seal must be free of weld, slag and spatter.
4. Stamp each plate with its pll no., 132RE where indicated.
5. Stamp turnout plates on alternate ends of plates so that the mark will allways be on the field side.
6. Welds shall be full penetration groove welds on shoulder and full penetration fillet welds on stops. (3/8")
7. FP Plates to be used where rail joint falls in transition area.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 2348

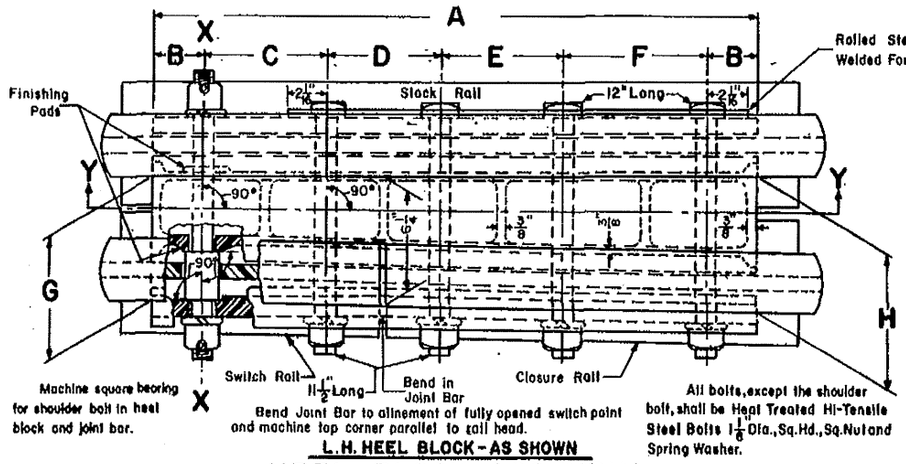
JAN. 5, 1996 (ISSUE DATE)

1 (ISSUE NO.)

SPECIAL FLAT AND TRANSITION CANTED PLATES

John D. Reay

SECTION CHIEF

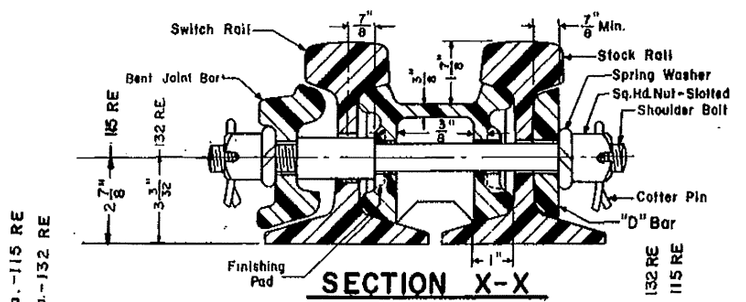


L.H. HEEL BLOCK - AS SHOWN

HEEL BLOCK ASSEMBLY

SECTION Y-Y

CAST STEEL, CLASS B - HARD OR DUCTILE IRON)



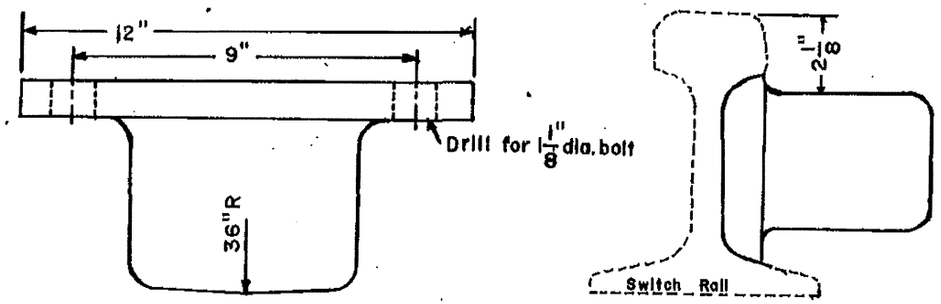
SECTION X-X

DETAIL OF SHOULDER BOLT

+ $2\frac{23}{32}$" *$8\frac{9}{32}$" — FOR 115 RE

HEEL BLOCK DIMENSIONS

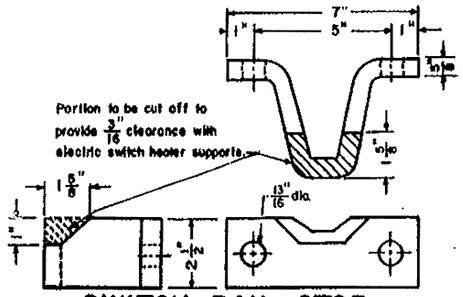
SWITCH LENGTH and RAIL SECTION	HEEL BLOCK LENGTH	BOLT HOLE SPACINGS					TOE END SPREAD	HEEL END SPREAD
	A	B	C	D	E	F	G	H
39'-115 RE	30"	2 7/16"	6"	7 1/8"	6"	6"	6 1/32"	6 19/32"
39'-132RE	"	"	"	"	"	"		
26'-115 RE	"	"	"	"	"	"	5 15/16"	6 11/16"
26'-132RE	"	"	"	"	"	"		
16'-6" 115 RE	"	"	"	"	"	"	5 29/32"	6 13/16"
16'-6" 132 RE	"	"	"	"	"	"		
11'-115. RE	"	"	"	"	"	"	5 3/4"	7"
11'-132 RE	"	"	"	"	"	"		



TOP VIEW

SIDE VIEW

FLOATING HEEL BLOCK



SWITCH RAIL STOP

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 2350

Oct. 28, 1992 ISSUE DATE

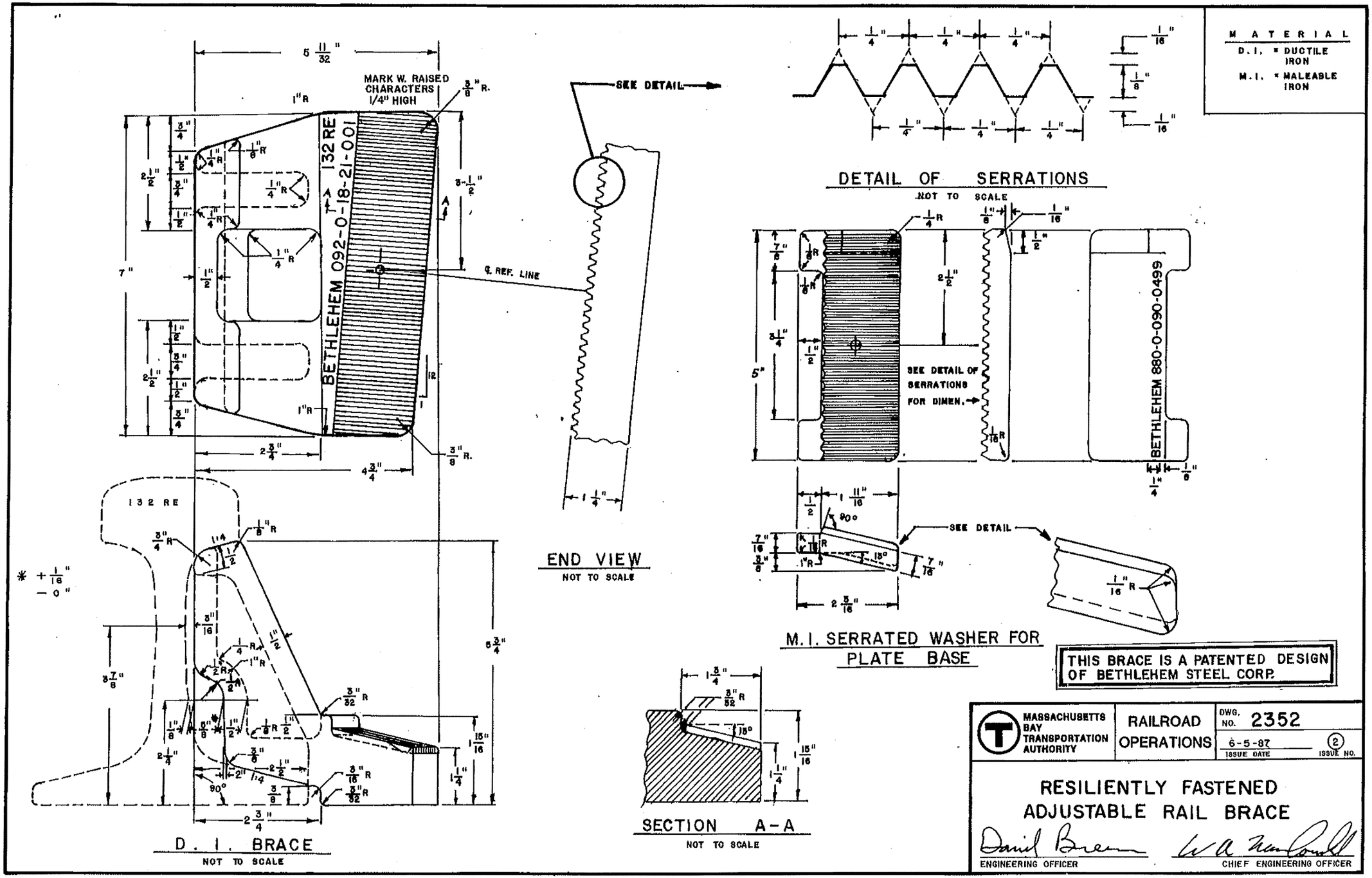
(2) ISSUE NO.

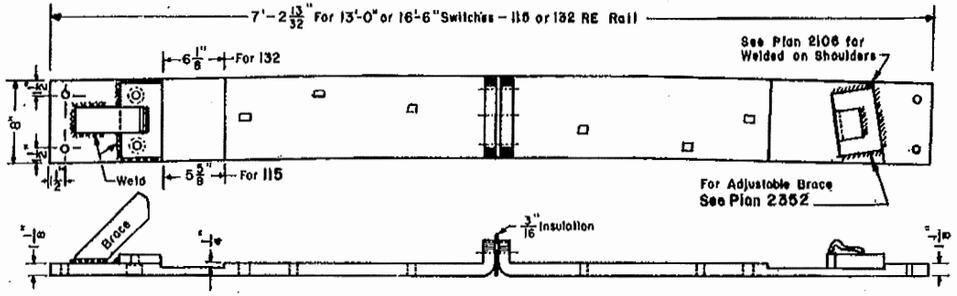
HEEL BLOCK AND SWITCH RAIL STOP

11', 16'-6", 26' & 39' SWITCHES - 115 R.E. & 132 R.E. RAIL

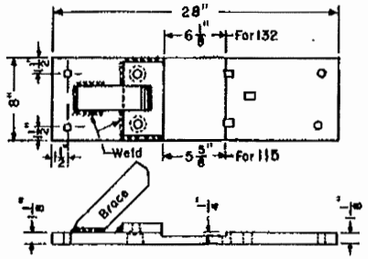
John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER

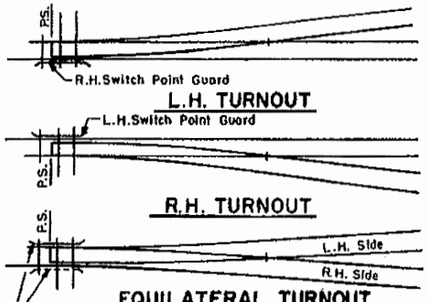

MATERIAL
D.I. = DUCTILE IRON
M.I. = MALEABLE IRON
MARK W. RAISED CHARACTERS 1/4" HIGH
BETHLEHEM 092-0-18-21-001
132 RE
SEE DETAIL
℄ REF. LINE
END VIEW
NOT TO SCALE
DETAIL OF SERRATIONS
NOT TO SCALE
SEE DETAIL OF SERRATIONS FOR DIMEN.
BETHLEHEM 880-0-090-0499
M.I. SERRATED WASHER FOR PLATE BASE
SEE DETAIL
THIS BRACE IS A PATENTED DESIGN OF BETHLEHEM STEEL CORP.
D.I. BRACE
NOT TO SCALE
SECTION A-A
NOT TO SCALE
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
RAILROAD OPERATIONS
DWG. NO. 2352
6-5-87 ISSUE DATE
2 ISSUE NO.
RESILIENTLY FASTENED ADJUSTABLE RAIL BRACE
ENGINEERING OFFICER
CHIEF ENGINEERING OFFICER


7'-2 13/32" For 13'-0" or 16'-6" Switches - 115 or 132 RE Rail
See Plan 2106 for Welded on Shoulders
6 1/8" For 132
5 5/8" For 115
Weld
For Adjustable Brace See Plan 2352
3/16" Insulation
Brace

GAGE PLATE "IG" - INSULATED



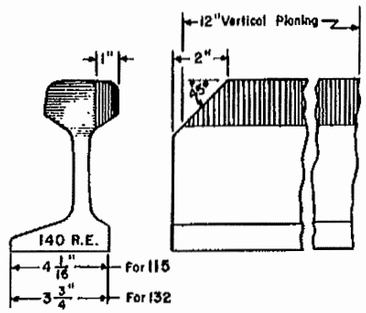
SLIDE PLATE "SP"



L.H. or (R.H.) Switch Point Guard shall be placed to protect the heavy traffic side.

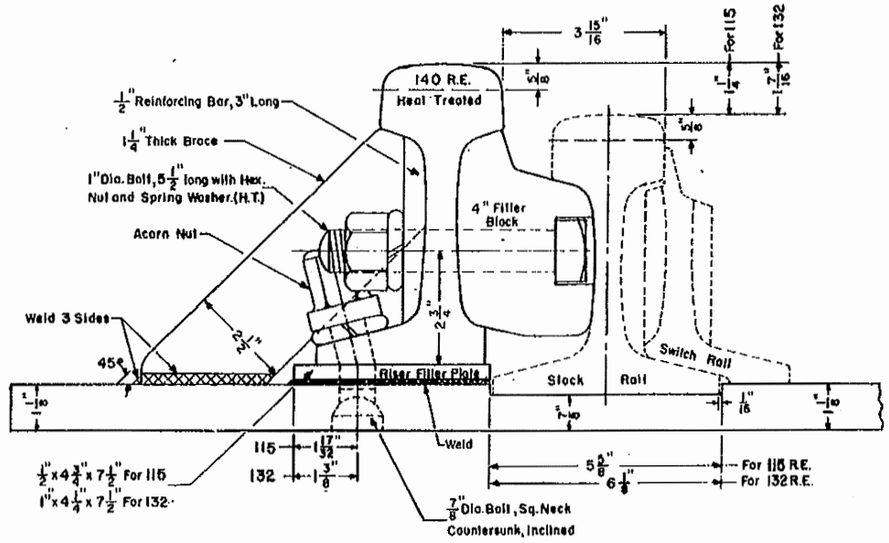
NOTE:- All switch point guards are located to protect the diverging point.

SWITCH POINT GUARD DESIGNATIONS

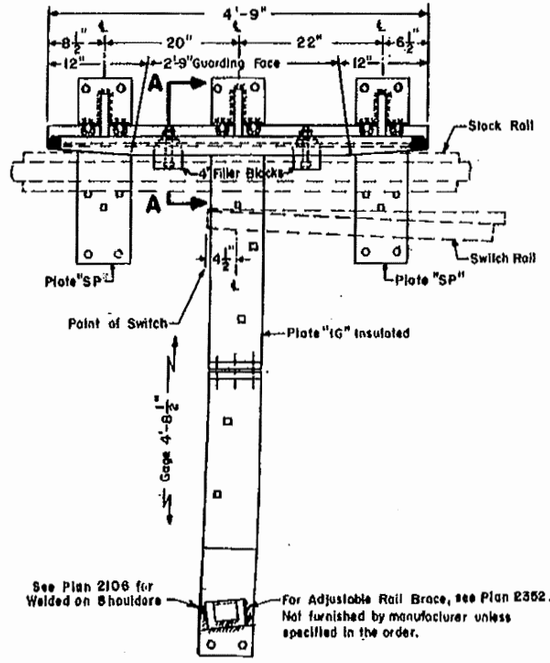


PLANING OF GUARD ENDS

Manufactured By Pettibone-Ohio
(Formerly Cleveland Frog & Crossing Co.)



SECTION A-A (TYPICAL)



PLAN

R.H. Turnout As Shown

NOTES

1- All plates to be open hearth mild steel
2- All guard rails heat treated and oil quenched to a Brinell Hardness of 321 to 375.
3- All plates to be stamped with plate designation and rail section. The gage plate to be also stamped with hand and length of switch rail.
4- When a non-insulated gage plate is required, the gage plate shall be furnished solid.
5- When ordering switch point guard specify- weight of rail, length of switch rail and hand.
6- All plate holding screw lag holes shall be 15/16" dia. to accomodate 7/8" screw lags.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 2356

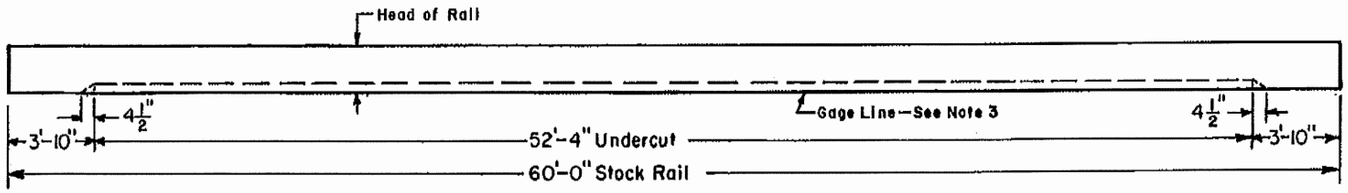
Oct. 28, 1992 (2)
ISSUE DATE ISSUE NO.

SWITCH POINT GUARD

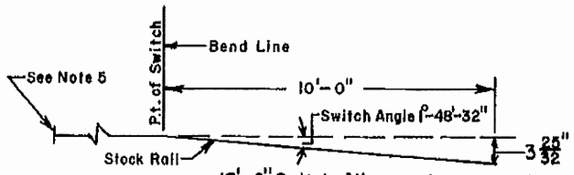
FOR 11' or 16'-6" SWITCHES - 115 or 132 RAIL

John D. Ray
ENGINEERING OFFICER

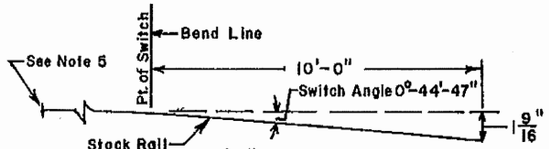
CHIEF ENGINEERING OFFICER



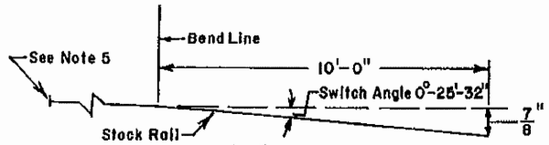
NO HAND
60 FT. UNDERCUT STOCK RAIL



16'-6" Switch Alignment
No. 8 and No. 10 Turnouts

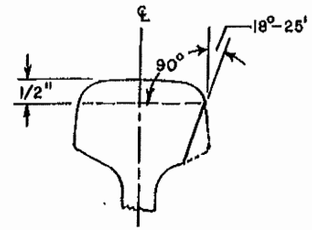


26'-0" Switch Alignment
No. 15 Turnout

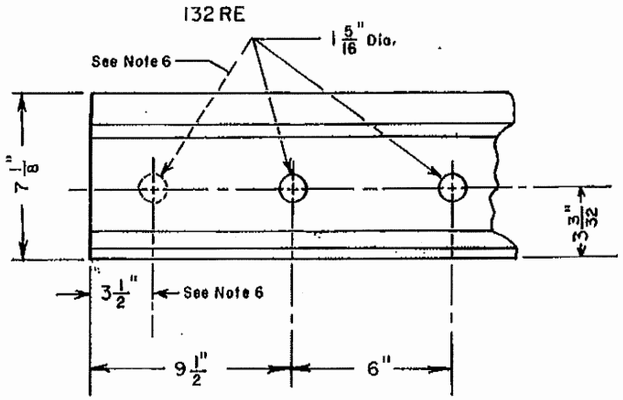


39'-0" Switch Alignment
No. 20 Turnout

BENDING OF STOCK RAILS
(See Notes 4 & 5)



DETAIL OF UNDERCUT



NOTES:

1. Rail to conform to current M B T A. specifications.
2. Stock rails to be fully heat treated.
3. Undercut to be on the opposite side of the rail brand.
4. Stock rails are to be bent and curved to the alignment specified on this Plan
5. Initial bend line location of stock rail will vary according to the distance the stock rail is placed ahead of the point of switch. The distance ahead of the point of switch to the end of the stock rail shall conform to MBTA Standard Plans: -

Turnout No.	Drawing No.	Switch Alignment	Stock Rails Ahead of Point	
			Straight	Curved
10	2112	16'-6"	10'-5"	14'-7 1/8"
15	2162	26'-0"	8'-9 1/4"	5'-0"
20	2212	39'-0"	9'-0 1/2"	5'-7 1/2"

6. When stock rail ends are not to be field welded, the first bolt hole shall be drilled in the field by installer.
7. For offsets for curving 60'-0" stock rails, see standard turnout plans. (Drawing No.'s are listed in table above.)

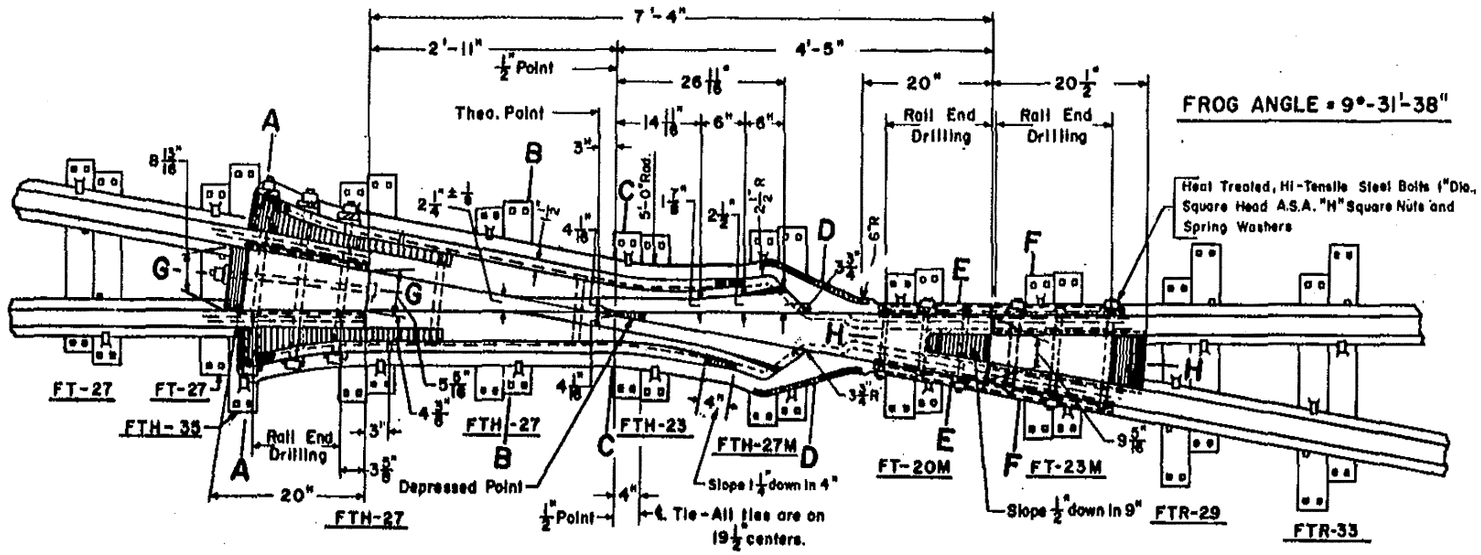
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY | RAILROAD OPERATIONS | DWG. NO. 2360

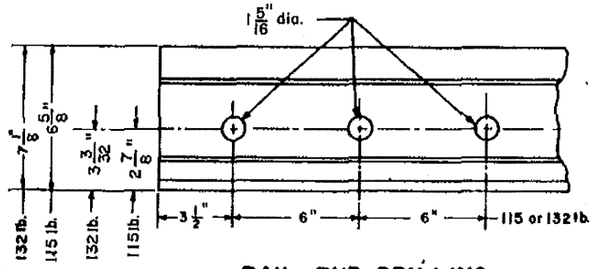
Oct. 28, 1992 (1)
ISSUE DATE ISSUE NO.

60 FT. UNDERCUT STOCK RAIL

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER

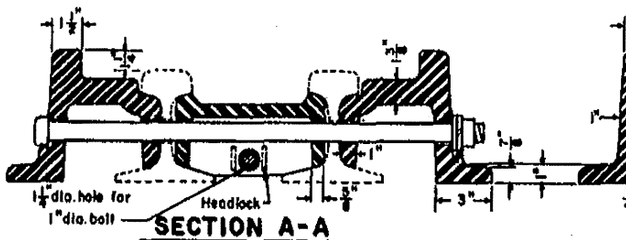




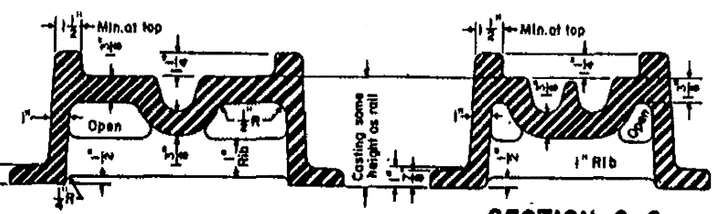
RAIL END DRILLING

FROG TIE PLATES REQUIRED

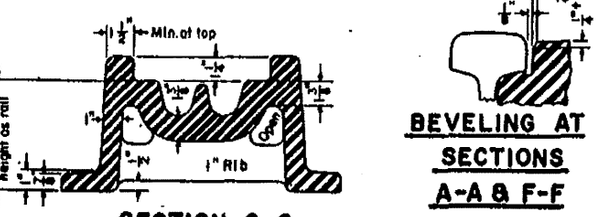
2 - FT 20 Mod.
2 - FT 23 Mod.
3 - FT 27
2 - FTH 23
4 - FTH 27
2 - FTH 27 Mod.
1 - FTH 35
2 - FTR 29
2 - FTR 33



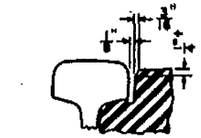
SECTION A-A



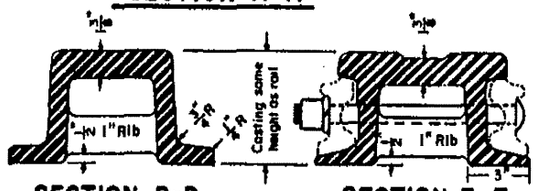
SECTION B-B



SECTION C-C

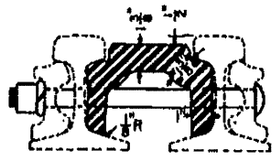


BEVELING AT SECTIONS A-A & F-F

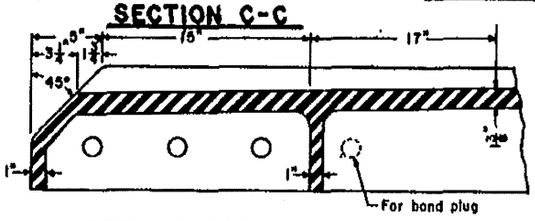


SECTION D-D

SECTION E-E



SECTION F-F



SECTION THRU TOE EXTENSION

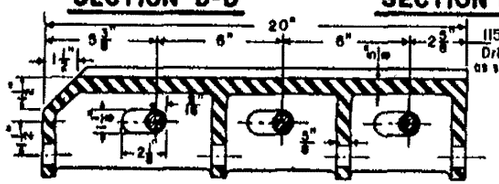
NOTES

1 - This plan is for use with A.R.E.A. recommended standards for 115 R.E., 132 R.E.

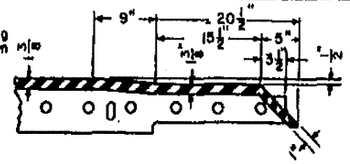
2 - Workmanship and materials shall be as per current "A.R.E.A Specifications."

3 - All bolts shall be dipped immediately before applying (so that all the threads are thoroughly coated) with Grease.

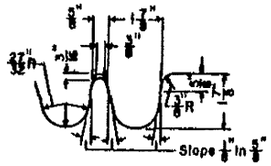
4 - All frog tie plates must be clearly marked to show plate designation.



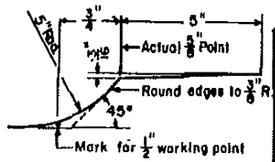
SECTION G-G



SECTION H-H



SECTION AT POINT



ELEVATION OF POINT

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 2370

Oct. 28, 1992 (ISSUE DATE) (1) (ISSUE NO.)

NO. 6 SOLID SELF-GUARDED MANGANESE STEEL FROG

John D. Bray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER

DIMENSIONS OF RAISED GUARDS						
RAIL SEC.	ANGLE-b	ANGLE-a	D	C	L	B
115 lb. 132 lb.	0°-34'-40"	7°-43'-50"	8'-0 11/16"	2 3/8"	2'-7"	7 11/16"

STRAIGHT CROSS RIBS SPACED APPROXIMATELY 18" CENTER TO CENTER.

FORMULA FOR VARIABLE RADIUS OF RAISED GUARDS

TAN ANGLE b = 5/16" / L

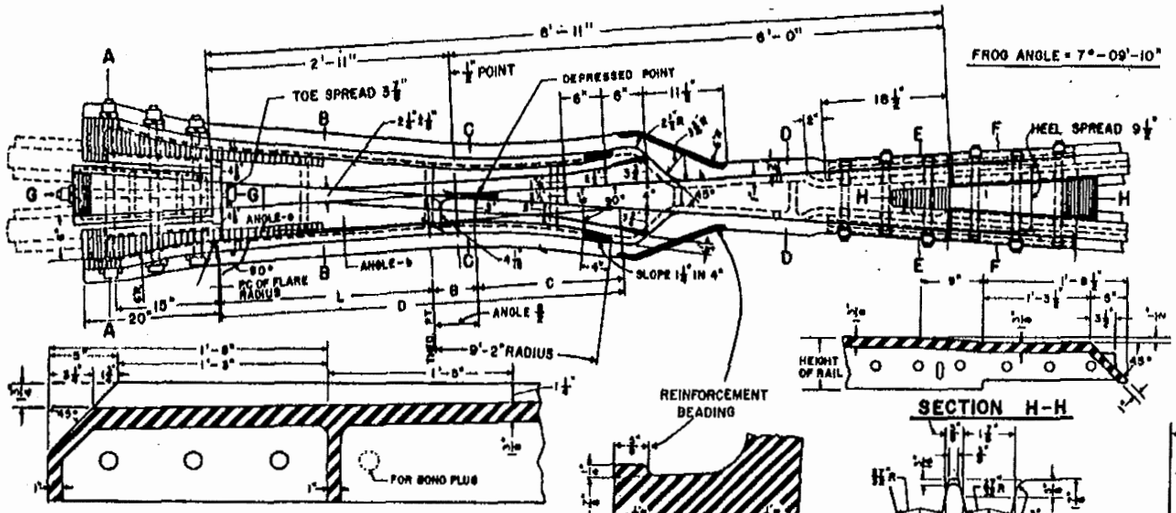
ANGLE a = ANGLE b + FROG ANGLE

D = TOE SPREAD + 4-3/8" / TAN a

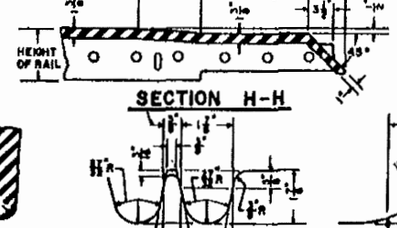
C = 3" / SIN a

B = D - (L + C)

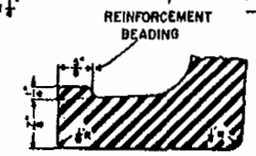
RADIUS = B / TAN a/2

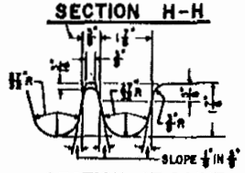


SECTION THRU TOE EXTENSION

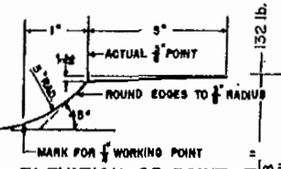


SECTION H-H

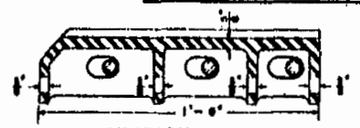




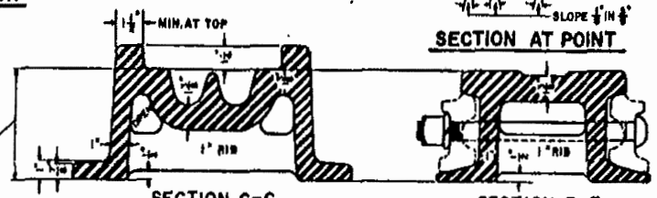
SECTION AT POINT



ELEVATION OF POINT



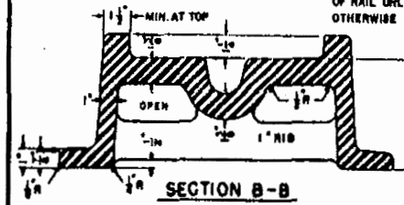
SECTION G-G



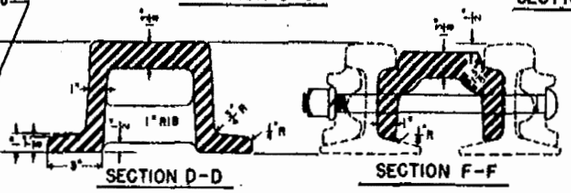
SECTION C-C

SECTION E-E

HEIGHT OF CASTING IS SAME AS HEIGHT OF RAIL UNLESS OTHERWISE SPECIFIED

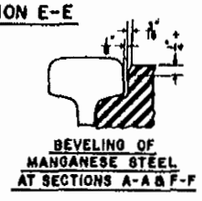


SECTION B-B

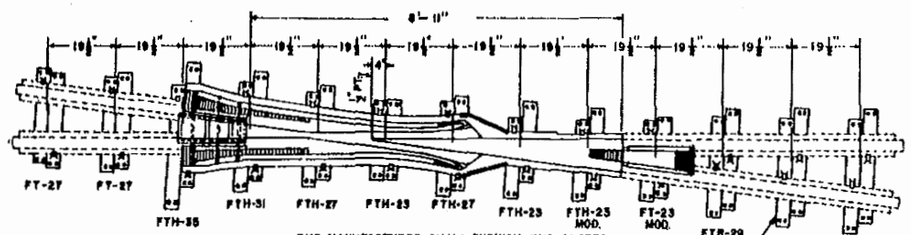


SECTION D-D

SECTION F-F

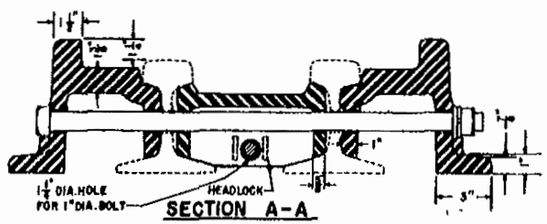


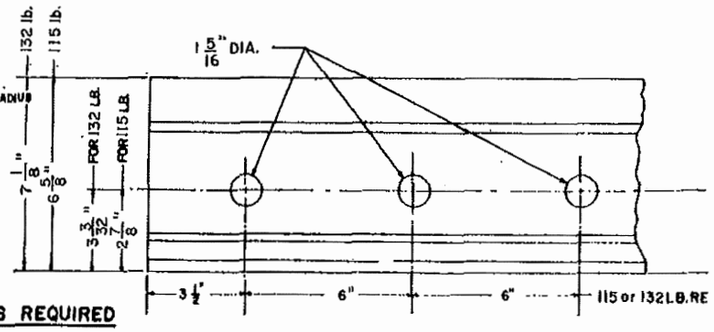
BEVELING OF MANGANESE STEEL AT SECTIONS A-A & F-F



THE MANUFACTURER SHALL FURNISH THE PLATES SHOWN ABOVE WITH THE FROG

LOCATION OF FROG TIE PLATES





RAIL END DRILLINGS

FROG TIE PLATES REQUIRED

2 - FT-23 MOD.	FROG TIE PLATES
4 - FTH-23	FROG TIE PLATES
2 - FTH-23 MOD.	FROG TIE PLATES
4 - FT-27	FROG TIE PLATES
4 - FTH-27	FROG TIE PLATES
2 - FTR-29	FROG TIE PLATES
2 - FTH-31	FROG TIE PLATES
2 - FTR-31	FROG TIE PLATES
2 - FTR-33	FROG TIE PLATES
2 - FTH-35	FROG TIE PLATES

NOTES

1 - THIS PLAN IS FOR USE WITH A.R.E.A. RECOMMENDED STANDARDS FOR 115 R.E., 132 R.E.

2 - WORKMANSHIP AND MATERIALS SHALL BE PER CURRENT "A.R.E.A. SPECIFICATIONS."

3 - ALL BOLTS SHALL BE DIPPED IMMEDIATELY BEFORE APPLYING (SO THAT ALL THREADS ARE THOROUGHLY COATED) WITH GREASE.

4 - ALL FROG TIE PLATES MUST BE CLEARLY MARKED TO SHOW PLATE DESIGNATION.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 2372

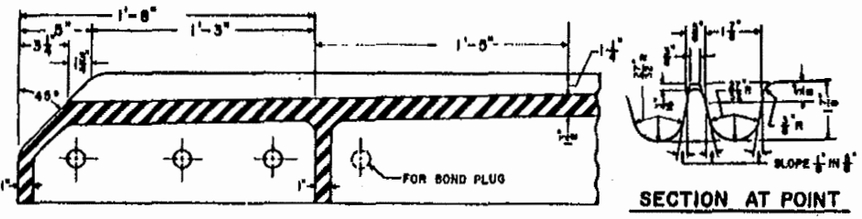
Oct. 28, 1992 (1)

ISSUE DATE ISSUE NO.

NO. 8 SOLID SELF-GUARDED MANGANESE STEEL FROG

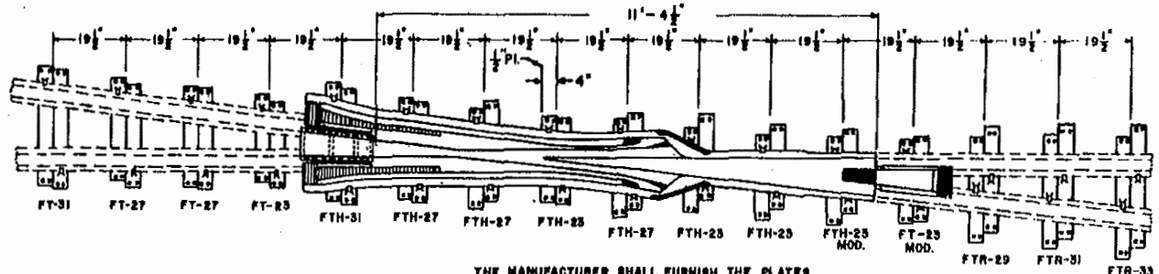
John D. Remy
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



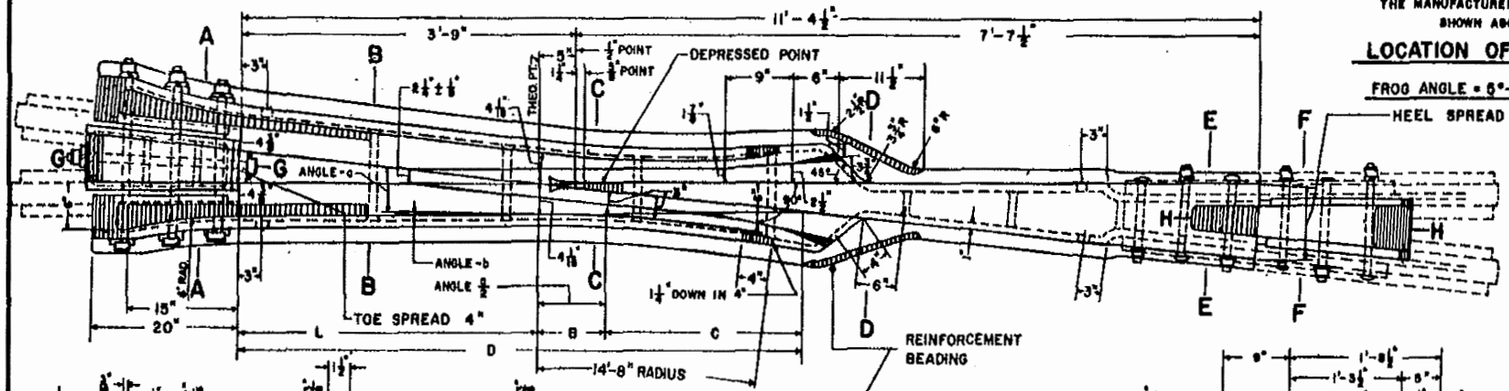
SECTION THRU TOE EXTENSION

SECTION AT POINT



THE MANUFACTURER SHALL FURNISH THE PLATES SHOWN ABOVE WITH THE FROG

LOCATION OF FROG TIE PLATES

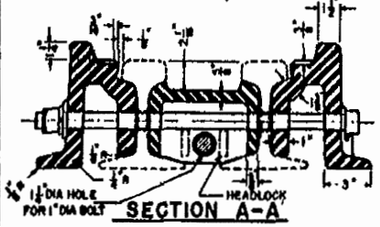


FROG ANGLE = 6°-43'-29"

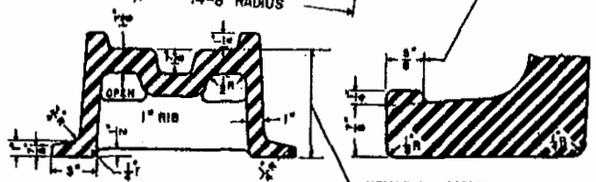
HEEL SPREAD 9 11/16"

FROG TIE PLATES REQUIRED

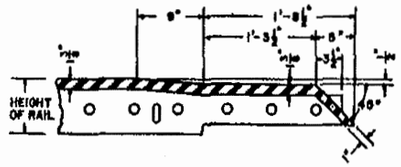
2 - FT 23	FROG TIE PLATES
2 - FT 23 MOD.	FROG TIE PLATES
4 - FT 27	FROG TIE PLATES
2 - FT 31	FROG TIE PLATES
6 - FTH 23	FROG TIE PLATES
2 - FTH 23 MOD	FROG TIE PLATES
6 - FTH 27	FROG TIE PLATES
2 - FTH 31	FROG TIE PLATES
2 - FTR 29	FROG TIE PLATES
2 - FTR 31	FROG TIE PLATES
2 - FTR 33	FROG TIE PLATES



SECTION A-A



SECTION B-B



SECTION H-H

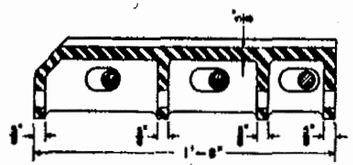
NOTES

1 - THIS PLAN IS FOR USE WITH A.R.E.A. RECOMMENDED STANDARDS FOR 115 R.E., 132 R.E.

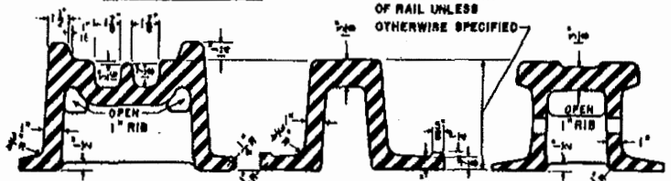
2 - WORKMANSHIP AND MATERIALS SHALL BE PER CURRENT A.R.E.A. SPECIFICATIONS.

3 - ALL BOLTS SHALL BE DIPPED IMMEDIATELY BEFORE APPLYING (SO THAT ALL THREADS ARE THOROUGHLY COATED) WITH GREASE.

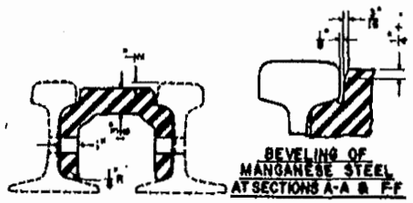
4 - ALL FROG TIE PLATES MUST BE CLEARLY MARKED TO SHOW PLATE DESIGNATION.



SECTION G-G



SECTION C-C SECTION D-D SECTION E-E



SECTION F-F

BEVELING OF MANGANESE STEEL AT SECTIONS A-A & F-F

DIMENSIONS OF RAISED GUARDS						
RAIL SEC.	ANGLE-b	ANGLE-a	D	C	L	B
115 lb. 132 lb.	0°-28'-30"	6°-10'-19"	6'-0 3/32"	2'-3 3/16"	3'-4"	9 11/16"

FORMULA FOR VARIABLE RADIUS OF RAISED GUARDS

TAN ANGLE = 5/16 / L

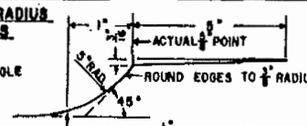
ANGLE a = ANGLE b + FROG ANGLE

D = (TOE SPREAD + 4 3/8") / TAN a

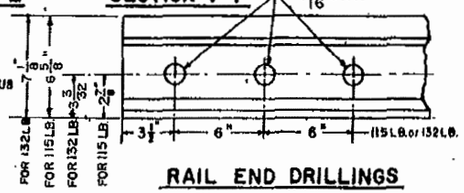
C = 9/16" / TAN a

B = D - (L + C)

RADIUS = 6 / TAN ½



ELEVATION OF POINT



RAIL END DRILLINGS

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 2374

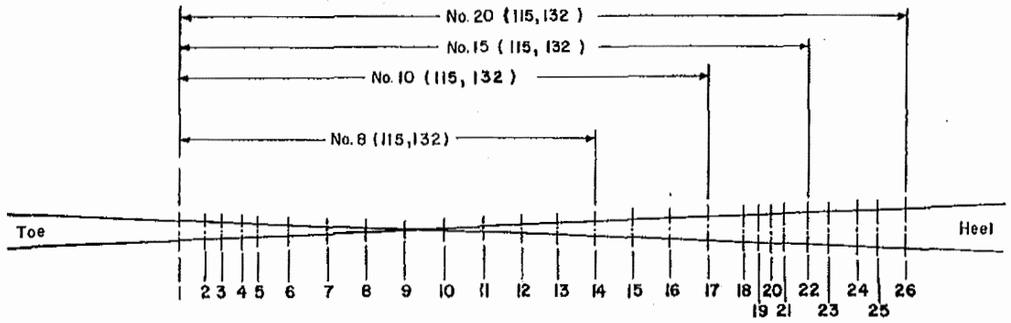
Oct. 28, 1992 (1)

ISSUE DATE ISSUE NO.

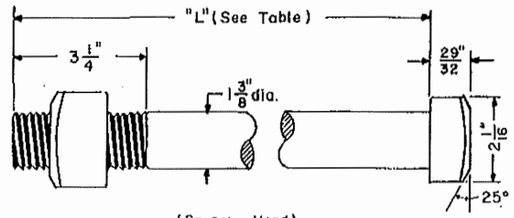
NO. 10 SOLID SELF-GUARDED MANGANESE STEEL FROG

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER

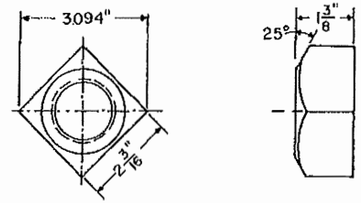


BOLT LOCATIONS



(Square Head)

FROG BOLT



SQUARE NUT

BOLT LENGTHS

FROG NO.	RAIL SECT.	PLAN NO.	BOLTS NUMBERED IN ORDER FROM TOE TO HEEL OF FROG — LENGTH "L" UNDER HEAD (INCHES)																										
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
8	115	2084	11	11	10	13	15	16	15	15	16	17	18	19	20	12												
	132		12	11	11	13	15	16	15	16	17	18	19	20	20	12												
10	115	2105	11	11	11	12	14	16	15	14	15	16	17	18	19	19	11	11	12									
	132		11	11	11	12	14	16	15	15	16	17	18	19	20	20	11	13	13									
15	115	2156	11	11	11	10	10	12	13	16	17	18	16	15	16	17	18	18	19	19	19	10	11	11				
	132		12	11	11	11	12	14	16	17	18	18	16	16	17	18	18	19	19	19	20	11	11	13				
20	115	2206	11	11	10	10	10	13	15	16	16	17	18	16	15	15	16	17	18	18	19	19	19	10	10	11	11	12
	132		11	11	10	10	10	13	15	16	16	17	18	16	15	15	16	17	18	18	19	19	19	10	10	11	11	12

NOTES

1 - Bolts and nuts shall conform to current AREA Specifications for special trackwork, Article 11, and details shown on this plan.
Bolts and nuts per A.S.A.-B18.2.2-1965
Threads-A.S.A.-B1.1-1960 Class 2 Fit, Coarse Thread Series with cut threads.

2 - All nuts to be wrench fit and Medium Carbon Steel. (0.40 Minimum - 0.55 Maximum)

3 - Bolts shall be 1 3/8" dia.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

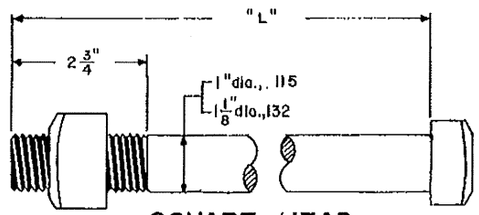
DWG. NO. 2502

Oct. 28, 1992 (ISSUE DATE) (1) (ISSUE NO.)

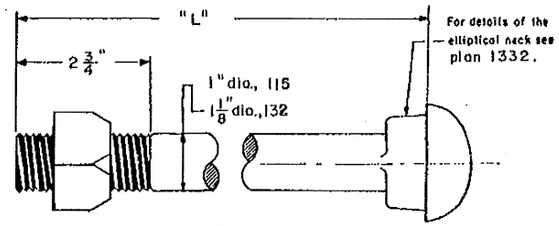
REPLACEMENT BOLTS FOR RAILBOUND MANGANESE FROGS

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER

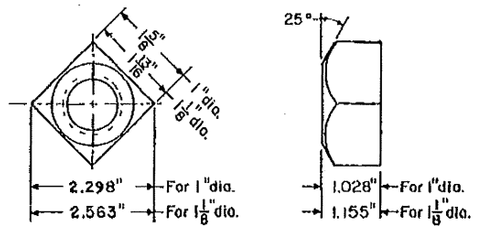


SQUARE HEAD

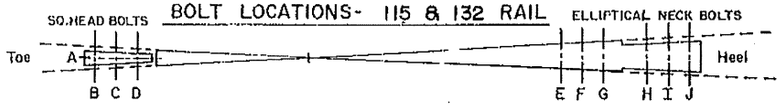


ELLIPTICAL NECK

FROG BOLTS



HEAVY SQUARE NUT



BOLT LENGTHS FOR FROG NOS. 6,8 & 10- 115 & 132 LB. RAIL

FROG NO.	RAIL SECTION	BOLT DIA.	BOLTS LETTERED IN ORDER-TOE TO HEEL OF FROG									
			SQUARE HEAD				ELLIPTICAL NECK					
			A	B	C	D	E	F	G	H	I	J
			LENGTH "L" UNDER HEAD (INCHES)									
6	115	1"	24	26	24	21	10	11	12	13	14	15
8			24	25	22	20	12	12	13	14	14	15
10			25	25	22	20	12	12	13	14	14	15
6	132	1 1/8"	24	26	24	21	10	11	12	14	14	15
8			24	25	22	20	12	13	13	14	15	14
10			24	24	22	20	12	12	13	14	14	15

NOTES

1 - Bolts and nuts shall conform to current A.R.E.A. Specifications for special trackwork, Article 14 and details shown on this plan:-
Bolts and nuts per A.S.A.-B18.2.2-1965
Threads - A.S.A.- B1.1-1960 Class 2 Fit, Coarse Threads Series with cut threads.

2 - All nuts to be wrench fit.

3 - Bolts for frogs 115 lbs. or lighter shall be 1" diameter;
Bolts for frogs heavier than 115 lbs. shall be 1 1/8" diameter.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

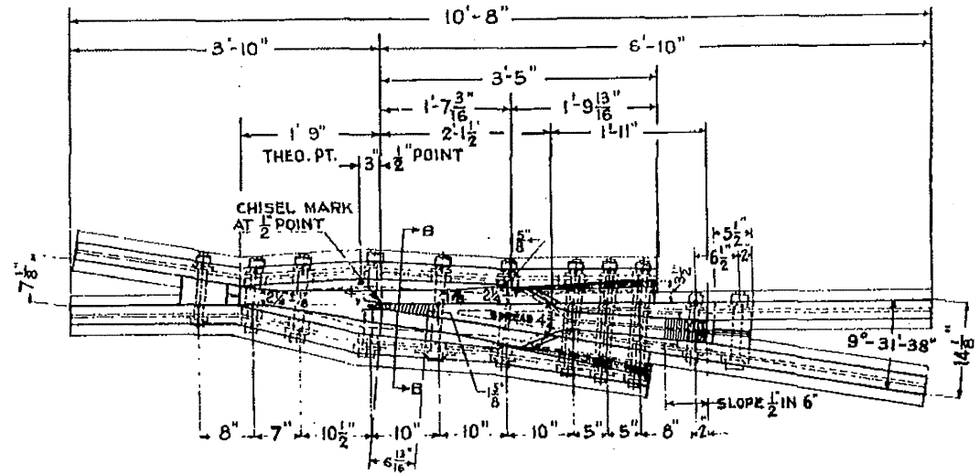
DWG. NO. 2504

Oct. 28, 1992 (1)
ISSUE DATE ISSUE NO.

REPLACEMENT BOLTS FOR SELF-GUARDED FROGS

John D. Ray
ENGINEERING OFFICER

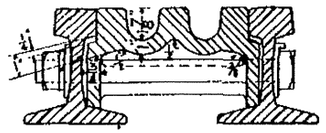
CHIEF ENGINEERING OFFICER



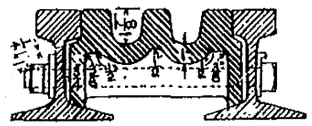
SCALE

INCHES 12 6 0 — 0 1 2 FEET

NOTE:- ACTUAL FROG POINT TO BE 3/16" BELOW WING LEVEL, SLOPING TO ZERO AT 1 5/8" WIDTH OF POINT (TOP SLOPE 3/16" IN 6 13/16")

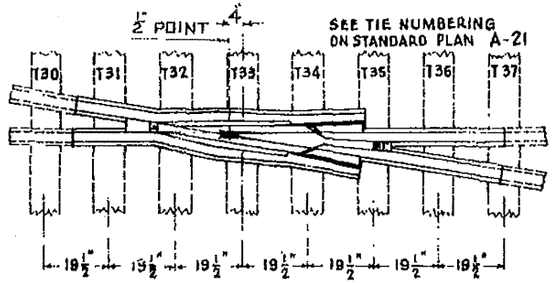


SECTION B-B
FOR 100 LB AND HEAVIER RAILS.



SECTION B-B
FOR 85 LB. RAILS

RAIL DRILLING FOR JOINTS					DIAM OF JOINT	BOLTS DIAM OVER THREADS	
WEIGHT	A	B'	C	D	HOLE	JOINT	FROG
85#	5 3/16"	2 17/64"	2 5/16"	6"	1 3/32"	15/16"	1 1/8"
100#	6"	2 3/4"	2 7/16"	7"	1 3/32"	1 1/16"	1 1/4"
112#	6 3/8"	2 7/8"	2 1/2"	6 1/2"	1 1/4"	1 1/8"	1 3/8"
130#	6 3/4"	3 1/16"	2 9/32"	5 1/2"	1 1/4"	1 1/2"	1 7/8"
131#	7 1/8"	3 3/32"	2 1/2"	6 1/2"	1 1/4"	1 1/8"	1 3/8"
115#	6 5/8"	2 7/8"	3 1/2"	6"	1 1/4"	1 1/16"	1 3/8"



TIE SPACING

SCALE

INCHES 12 6 0 — 0 1 2 3 FEET

NOTES:-

DESIGN, DETAILS AND CONSTRUCTION SHALL CONFORM TO THE PLANS ADOPTED BY THE AMERICAN RAILWAY ENGINEERING ASSOCIATION AS RECOMMENDED PRACTICE.

REFERENCES TO A.R.E.A. TRACKWORK PLANS:-
*600 - DATA AND SECTIONS. *600-B- FROG POINT AND FLANGEWAYS.
*601-3 GENERAL PLAN. NOTE-NO. 3.

FROG BOLTS- A.R.E.A. SPECIFICATIONS 1936. FOR HIGH TENSILE STRENGTH, QUENCHED CARBON BOLTS WITH SQUARE HEADS, EXTRA HEAVY SQUARE NUTS, NUT LOCKS, ROLLED STEEL ANGLE WASHERS AND HEAD LOCKS; MANG. HOLES 1/4" LARGER THAN FROG BOLT DIA.

PLATES- THICKNESS 1". FURNISHED ONLY WHEN SPECIFIED. FOOT GUARDS FURNISHED BY R.R.

WORKMANSHIP AND MATERIALS- A.R.E.A. SPECIFICATIONS FOR GENERAL TRACKWORK.

NOTES:- ON FROG CASTING FOR 100#-112#-115#-130#-131# RAILS.
BOLT SHROUDS TO BE ELIMINATED. CROSS RIBS BETWEEN THE SIDE WALLS TO BE S-SHAPED. CROSS RIBS TO BE ATTACHED TO SIDE WALLS ONLY, AND TO BE PLACED APPROXIMATELY EVERY SECOND BOLT SPACING AND OCCUR BETWEEN BOLT HOLES.
I BEAM DESIGN TO BE USED IN HEEL EXTENSION.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

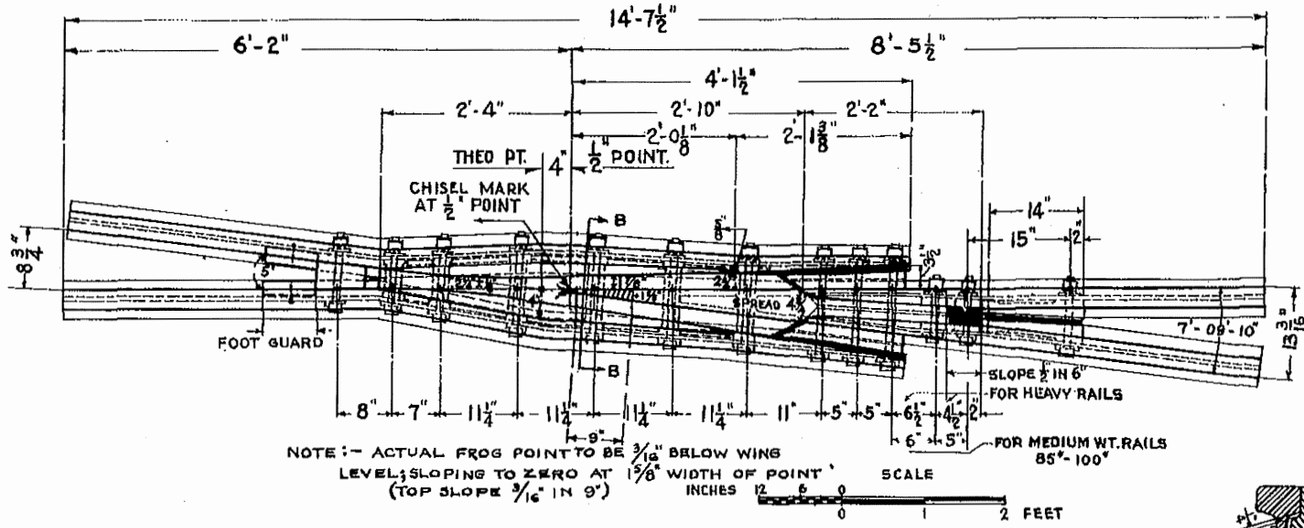
DWG. NO. 2506

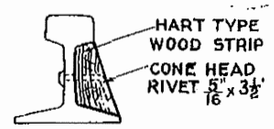
Nov. 17, 1986 (1)
ISSUE DATE ISSUE NO.

B & M NO. 6 RAILBOUND MANGANESE STEEL FROG

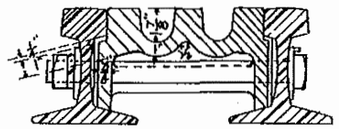
Daniel Bacon
ENGINEERING OFFICER

W A Munbusted
CHIEF ENGINEERING OFFICER

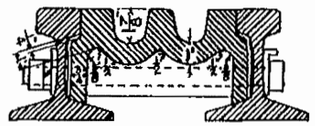




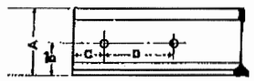
FOOT GUARD

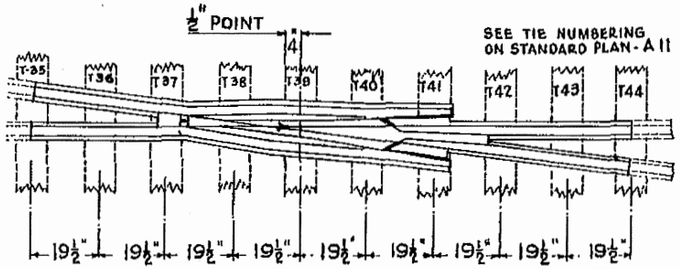


SECTION B-B
FOR 100 LB. AND HEAVIER RAILS



SECTION B-B
FOR 85 LB. RAILS




½" POINT
4
SEE TIE NUMBERING ON STANDARD PLAN - A II
T-35 T36 T37 T38 T39 T40 T41 T42 T43 T44
19½" 19½" 19½" 19½" 19½" 19½" 19½" 19½" 19½"
SCALE
INCHES 12 6 0
0 1 2 3 FEET

TIE SPACING

RAIL DRILLING FOR JOINTS.					DIAM. OF JOINT	BOLTS DIAM. OVER THREADS.	
WEIGHT	A	B	C	D	HOLE	JOINT	FROG
85#	5 5/16"	2 17/64"	2 1/16"	6"	1 3/32"	1 1/16"	1 1/8"
100#	6"	2 15/64"	2 1/16"	7"	1 3/32"	1 1/16"	1 1/4"
112#	6 5/8"	2 1/8"	2½"	6½"	1¼"	1 1/8"	1 3/8"
130#	6¼"	3 1/16"	2 13/32"	5½"	1¼"	1 1/8"	1 1/8"
131#	7 1/8"	3 3/32"	2½"	6½"	1¼"	1 1/8"	1 3/8"
115#	6 5/8"	2 7/8"	3½"	6"	1¼"	1 1/8"	1 5/8"

NOTES:-

DESIGN, DETAILS AND CONSTRUCTION SHALL CONFORM TO THE PLANS ADOPTED BY THE AMERICAN RAILWAY ENGINEERING ASSOCIATION AS RECOMMENDED PRACTICE.

REFERENCES TO A.R.E.A. TRACKWORK PLANS.-
#600 - DATA AND SECTIONS. #600-B - FROG POINT AND FLANGEWAYS.
#601-3 GENERAL PLAN, NOTE NO. 3

FROG BOLTS - A.R.E.A SPECIFICATIONS 1936 FOR HIGH TENSILE STRENGTH, QUENCHED CARBON BOLTS WITH SQUARE HEADS, EXTRA HEAVY SQUARE NUTS, NUT LOCKS, ROLLED STEEL ANGLE WASHERS AND HEAD LOCKS. MANG. HOLES ¼" LARGER THAN FROG BOLT DIA.

PLATES - THICKNESS 1". FURNISHED ONLY WHEN SPECIFIED. FOOT GUARDS FURNISHED BY R.R.

WORKMANSHIP AND MATERIALS - A.R.E.A. SPECIFICATIONS FOR GENERAL TRACKWORK.

NOTES:- ON FROG CASTING FOR - 100# - 112# - 115# - 130# - 131# RAILS.
BOLT SHROUDS TO BE ELIMINATED. CROSS RIBS BETWEEN THE SIDE WALLS TO BE S-SHAPED. CROSS RIBS TO BE ATTACHED TO SIDE WALLS ONLY, AND TO BE PLACED APPROXIMATELY EVERY SECOND BOLT SPACING AND OCCUR BETWEEN BOLT HOLES.
T BEAM DESIGN TO BE USED IN HEEL EXTENSION.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

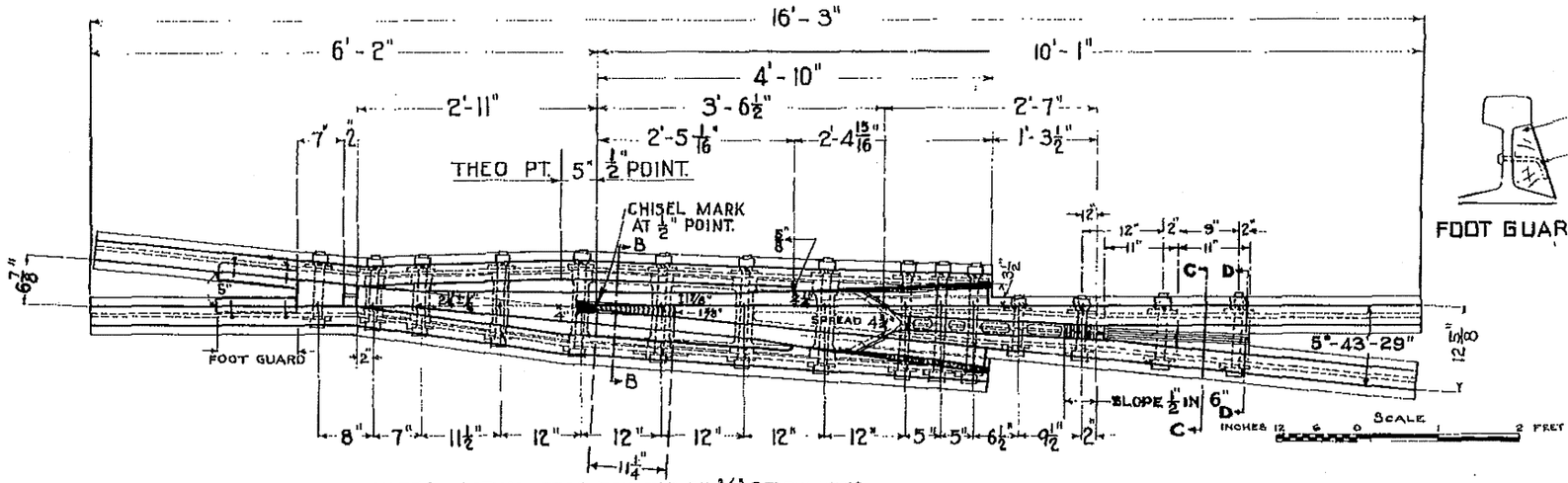
DWG. NO. 2508

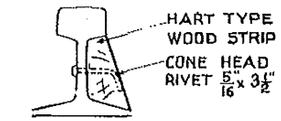
Nov. 17, 1986 (1)
ISSUE DATE ISSUE NO.

B & M NO. 8 RAILBOUND MANGANESE STEEL FROG

David Brown
ENGINEERING OFFICER

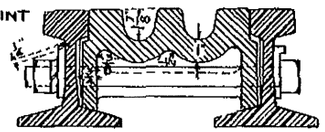
W A Mudge
CHIEF ENGINEERING OFFICER



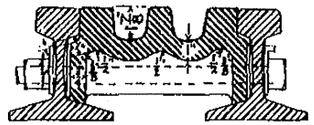


FOOT GUARD

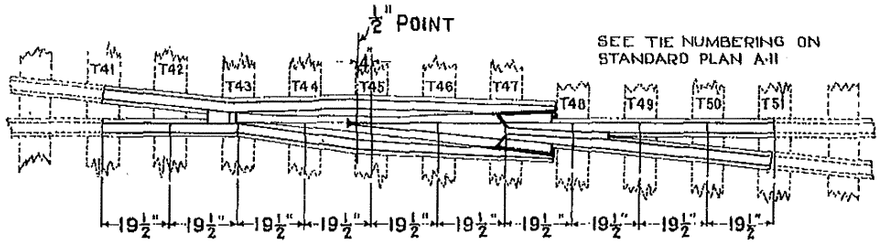
NOTE :- ACTUAL FROG POINT TO BE 3/16" BELOW WING LEVEL; SLOPING TO ZERO AT 1 5/8" WIDTH OF POINT (TOP SLOPE 3/16" IN 11¼")



SECTION B-B
FOR 100 LB. AND HEAVIER RAILS

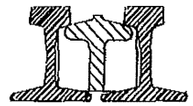


SECTION B-B
FOR 85 LB RAIL ONLY

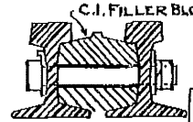

½" POINT
SEE TIE NUMBERING ON STANDARD PLAN A-11
T41 T42 T43 T44 T45 T46 T47 T48 T49 T50 T51
19½" 19½" 19½" 19½" 19½" 19½" 19½" 19½" 19½" 19½"

TIE SPACING

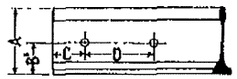
SCALE
INCHES 12 6 0
0 1 2 3 FEET



SECTION C-C
FOR 100 LB. & HEAVIER RAILS



SECTION D-D



RAIL DRILLING FOR JOINTS					DIAM. OF JOINT	BOLTS DIAM. OVER THREADS	
WEIGHT	A	B'	C	D	HOLE	JOINT	FROG
85#	5 3/16"	2 17/64"	2 15/16"	6"	1 3/32"	15/16"	1 1/8"
100#	6"	2 39/64"	2 7/16"	7"	1 3/32"	1 1/16"	1 1/4"
112#	6 5/8"	2 7/8"	2½"	6½"	1¼"	1 1/8"	1 3/8"
130#	6¾"	3 1/16"	2 13/32"	5½"	1¼"	1 1/8"	1 3/8"
131#	7 1/8"	3 3/32"	2½"	6½"	1¼"	1 1/8"	1 3/8"
115#	6 5/8"	2 7/8"	3½"	6"	1¼"	1 1/8"	1 3/8"

NOTES:-

DESIGN, DETAILS AND CONSTRUCTION SHALL CONFORM TO THE PLANS ADOPTED BY THE AMERICAN RAILWAY ENGINEERING ASSOCIATION AS RECOMMENDED PRACTICE.

REFERENCES TO A.R.E.A. TRACKWORK PLANS.—

#600 - DATA AND SECTIONS. #600-8- FROG POINT & FLANGEWAYS.
#604-5- GENERAL PLAN, NOTE NO. 3.

FROG BOLTS- A.R.E.A. SPECIFICATIONS 1936 FOR HIGH TENSILE STRENGTH, QUENCHED CARBON BOLTS WITH SQUARE HEADS, EXTRA HEAVY SQUARE NUTS, NUT LOCKS, ROLLED STEEL ANGLE WASHERS AND HEAD LOCKS. MANG. HOLES ¼" LARGER THAN FROG BOLT DIA.

PLATES- THICKNESS 1". FURNISHED ONLY WHEN SPECIFIED. FOOT GUARDS FURNISHED BY R.R.

WORKMANSHIP AND MATERIALS- A.R.E.A. SPECIFICATIONS FOR GENERAL TRACKWORK.

NOTES - ON FROG CASTING FOR 100#-112#-115#-130#-131# RAILS.

BOLT SHROUDS TO BE ELIMINATED. CROSS RIBS BETWEEN THE SIDE WALLS TO BE S-SHAPED. CROSS RIBS TO BE ATTACHED TO SIDE WALLS ONLY AND TO BE PLACED APPROXIMATELY EVERY SECOND BOLT SPACING AND OCCUR BETWEEN BOLT HOLES.

I BEAM DESIGN TO BE USED IN HEEL EXTENSION.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

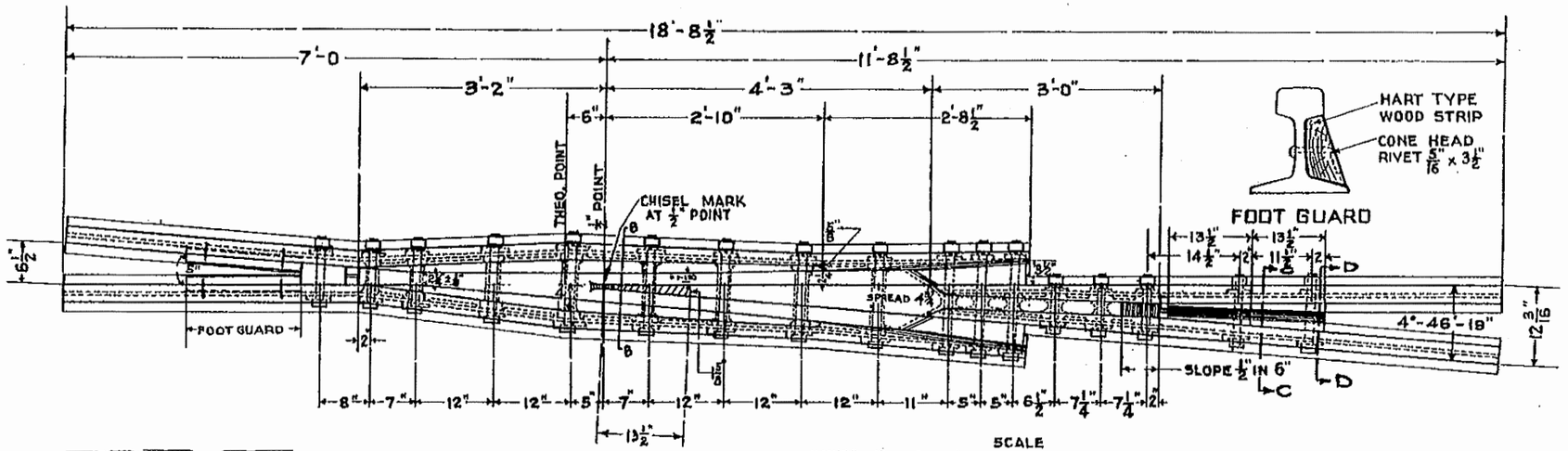
DWG. NO. 2510

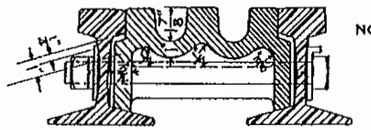
Nov. 17, 1986 (1)
ISSUE DATE ISSUE NO.

B & M NO. 10 RAILBOUND MANGANESE STEEL FROG

Daniel Brown
ENGINEERING OFFICER

W A MacDonald
CHIEF ENGINEERING OFFICER



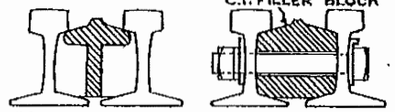


SECTION B-B
FOR 100 LB AND HEAVIER RAILS

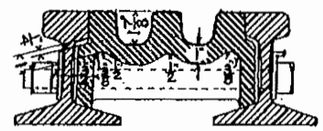
NOTE :- ACTUAL FROG POINT TO BE 3/16" BELOW WING LEVEL; SLOPING TO ZERO AT 1 5/8" WIDTH OF POINT (TOP SLOPE 3/16" IN 13½")

SCALE
INCHES 12 6 0
0 1 2 FEET

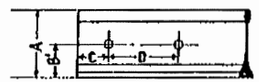
C.I. FILLER BLOCK



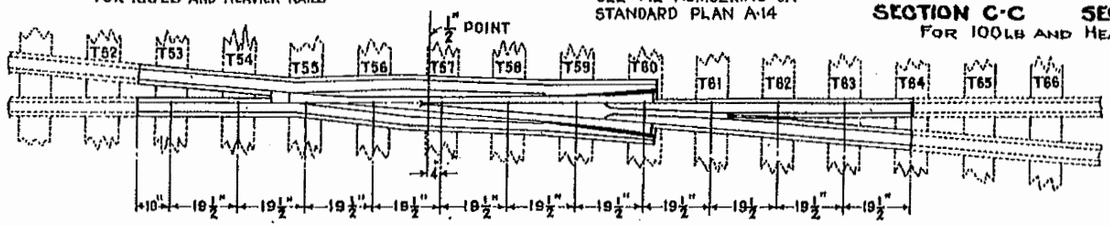
SECTION C-C **SECTION D-D**
FOR 100 LB AND HEAVIER RAILS



SECTION B-B
FOR 85 LB RAIL



SEE TIE NUMBERING ON STANDARD PLAN A-14



TIE SPACING

SCALE
INCHES 12 6 0
0 1 2 3 FEET

RAIL	DRILLING FOR JOINTS				DIAM OF JOINT	BOLTS DIAM. OVER THREADS	
WEIGHT	A	B	C	D	HOLE	JOINT	FROG
85#	5 3/16"	2 7/64"	2 5/16"	6"	1 3/32"	1"/16"	1"/16"
100#	6"	2 1/64"	2 5/16"	7"	1 3/32"	1 1/16"	1 1/4"
112#	6 5/8"	2 7/8"	2 1/2"	6½"	1 1/4"	1"/16"	1 5/8"
130#	6¼"	3 1/16"	2 13/32"	5½"	1 1/4"	1 1/8"	1 5/8"
131#	7 1/8"	3 3/32"	2½"	6½"	1 1/4"	1 1/8"	1 1/8"
115#	6 5/8"	2 7/8"	3½"	6"	1 1/4"	1 1/8"	1 3/8"

NOTES:-

DESIGN, DETAILS AND CONSTRUCTION SHALL CONFORM TO THE PLANS ADOPTED BY THE AMERICAN RAILWAY ENGINEERING ASSOCIATION AS RECOMMENDED PRACTICE.

REFERENCES TO A·R·E·A· TRACKWORK PLANS:-
#600 - DATA AND SECTIONS. #600-B - FROG POINT AND FLANGEWAYS.
#609 - GENERAL PLAN. NOTE-NO. 3.

FROG BOLTS - A R E A. SPECIFICATIONS 1936 FOR HIGH TENSILE STRENGTH, QUENCHED CARBON BOLTS WITH SQUARE HEADS, EXTRA HEAVY SQUARE NUTS, NUT LOCKS, ROLLED STEEL ANGLE WASHERS AND HEAD LOCKS. MANG. HOLES ¼" LARGER THAN FROG BOLT DIA.

PLATES - THICKNESS 1", FURNISHED ONLY WHEN SPECIFIED. FOOT GUARDS FURNISHED BY R.R.

WORKMANSHIP AND MATERIALS A·R·E·A· SPECIFICATIONS FOR GENERAL TRACKWORK.

NOTES ON FROG CASTING FOR 100#-112#-115#-130#-131# RAILS.
BOLT SHROUDS TO BE ELIMINATED. CROSS RIBS BETWEEN THE SIDE WALLS TO BE S-SHAPED. CROSS RIBS TO BE ATTACHED TO SIDE WALLS ONLY, AND TO BE PLACED APPROXIMATELY EVERY SECOND BOLT SPACING AND OCCUR BETWEEN BOLT HOLES.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

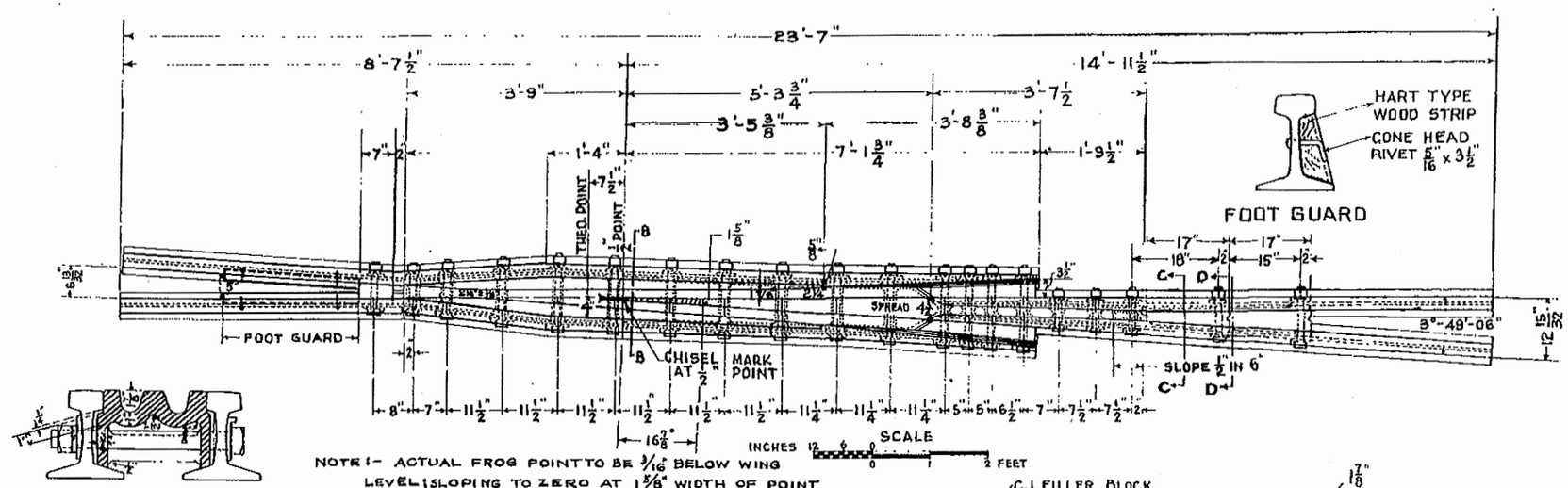
DWG. NO. 2512

Nov. 17, 1986 (1)
ISSUE DATE ISSUE NO.

B & M NO. 12 RAILBOUND MANGANESE STEEL FROG

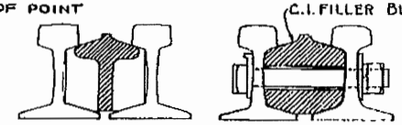
Daniel Braun
ENGINEERING OFFICER

W A Mudd
CHIEF ENGINEERING OFFICER

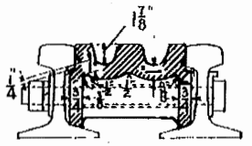


NOTE:- ACTUAL FROG POINT TO BE 3/16" BELOW WING LEVEL, SLOPING TO ZERO AT 1⅝" WIDTH OF POINT (TOP SLOPE 3/16" IN 16⅞")

SECTION B-B
FOR 100 LB. & HEAVIER RAILS

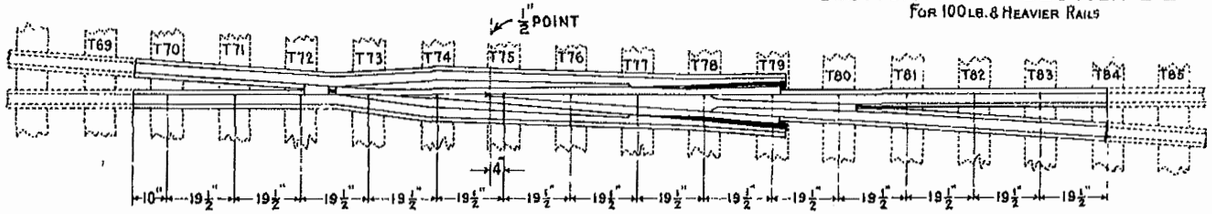


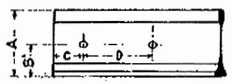
SECTION C-C **SECTION D-D**
FOR 100 LB. & HEAVIER RAILS



SECTION B-B
FOR 85 LB. RAIL

SEE TIE NUMBERING ON STANDARD PLAN A-15



TIE SPACING

RAIL	DRILLING FOR JOINTS				DIAM. OF	BOLTS DIAM. OVER THREADS	
WEIGHT	A	B'	C	D	HOLE	JOINT	FROG
85#	5 3/16"	2 7/64"	2 15/16"	6"	1 3/32"	15/16"	1 1/8"
100#	6"	2 3/64"	2 7/16"	7"	1 3/32"	1 1/16"	1 1/4"
112#	6 5/8"	2 7/8"	2½"	6½"	1¼"	1⅛"	1 3/8"
130#	6¾"	3 1/16"	2 13/32"	5½"	1¼"	1⅛"	1 3/8"
131#	7⅛"	3 3/32"	2½"	6½"	1¼"	1⅛"	1 3/8"
115#	6 5/8"	2⅞"	3½"	6"	1¼"	1⅛"	1 3/8"

NOTES:- MEASUREMENTS AS SHOWN.

DESIGN, DETAILS AND CONSTRUCTION SHALL CONFORM TO THE PLANS ADOPTED BY THE AMERICAN RAILWAY ENGINEERING ASSOCIATION AS RECOMMENDED PRACTICE.

REFERENCES TO A·R·E·A· TRACKWORK PLANS:-

#600 - DATA AND SECTIONS. #600-B - FROG POINT AND FLANGWAYS.

#610 - GENERAL PLANS, NOTE-NO. 3.

FROG BOLTS - AREA SPECIFICATIONS 1936 FOR HIGH TENSILE STRENGTH, QUENCHED CARBON BOLTS WITH SQUARE HEADS, EXTRA HEAVY SQUARE NUTS, NUT LOCKS, ROLLED STEEL ANGLE WASHERS AND HEAD LOCKS. MANG. HOLES ¼" LARGER THAN FROG BOLT DIA.

PLATES - THICKNESS 1". FURNISHED ONLY WHEN SPECIFIED. FOOT GUARDS FURNISHED BY R.R.

WORKMANSHIP AND MATERIALS - A·R·E·A· SPECIFICATIONS FOR GENERAL TRACKWORK.

NOTES - ON FROG CASTING FOR 100#-112#-115#-130#-131# RAILS.

BOLT SHROUDS TO BE ELIMINATED. CROSS RIBS BETWEEN THE SIDE WALLS TO BE S-SHAPED. CROSS RIBS TO BE ATTACHED TO SIDE WALLS ONLY AND TO BE PLACED APPROXIMATELY EVERY SECOND BOLT SPACING AND OCCUR BETWEEN BOLT HOLES.

I BEAM DESIGN TO BE USED IN HEEL EXTENSION

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 2515

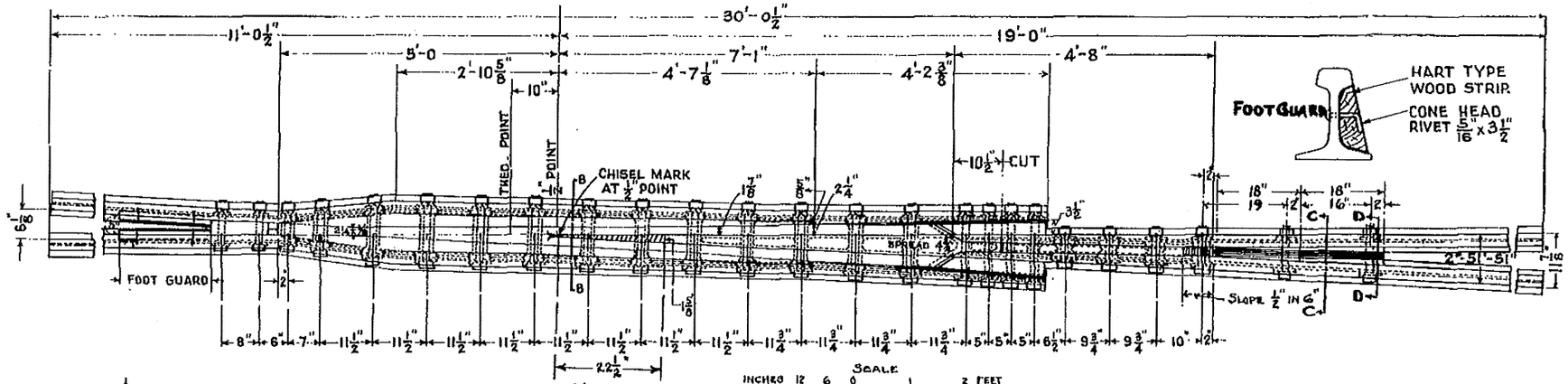
Nov. 17, 1986 ISSUE DATE

1 ISSUE NO.

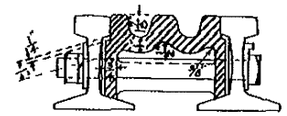
B & M NO. 15 RAILBOUND MANGANESE STEEL FROG

Daniel Brum
ENGINEERING OFFICER

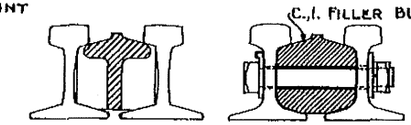
W A Mansfield
CHIEF ENGINEERING OFFICER



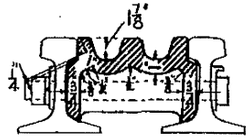
NOTE:- ACTUAL FROG POINT TO BE 3/16" BELOW WING LEVEL, SLOPING TO ZERO AT 1⅝" WIDTH OF POINT (TOP SLOPE 3/16" IN 22½")



SECTION B-B
FOR 100 LB. AND HEAVIER RAILS

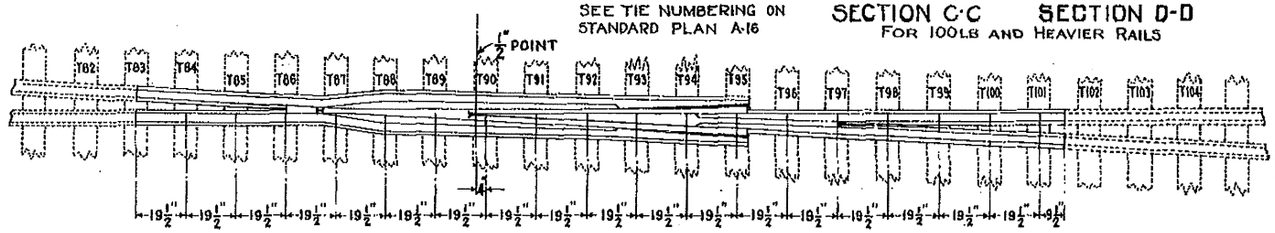


SECTION C-C **SECTION D-D**
FOR 100LB AND HEAVIER RAILS



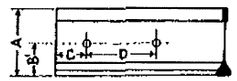
SECTION B-B
FOR 85 LB. RAIL

SEE TIE NUMBERING ON STANDARD PLAN A-16



TIE SPACING

SCALE
INCHES 12 6 0
0 1 2 3 4 FEET



RAIL DRILLING FOR JOINTS					DIAM. OF	BOLTS DIAM. OVER THREADS	
WEIGHT	A	B'	C	D	HOLE	JOINT	FROG
85#	5 5/16"	2 17/64"	2 5/16"	6"	1 3/32"	15/16"	1/8"
100#	6"	2 3/8"	2 7/16"	7"	1 1/32"	1 1/16"	1 1/4"
112#	6 5/8"	2 7/8"	2½"	6½"	1¼"	1 1/8"	1 3/8"
130#	6¼"	3 1/16"	2 13/32"	5½"	1¼"	1 1/8"	1 3/8"
131#	7⅛"	3 3/32"	2½"	6½"	1¼"	1⅛"	1 3/8"
115#	6 5/8"	2 7/8"	3½"	6"	1¼"	1⅛"	1 3/8"

NOTES

DESIGN, DETAILS, AND CONSTRUCTION SHALL CONFORM TO THE PLANS ADOPTED BY THE AMERICAN RAILWAY ENGINEERING ASSOCIATION AS RECOMMENDED PRACTICE.

REFERENCES TO A·R·E·A· TRACKWORK PLANS.–

#600 – DATA AND SECTIONS. #600-8 – FROG POINT AND FLANGEWAYS. #606-7 – GENERAL PLAN. NOTE - NO. 3.

FROG BOLTS – A.R.E.A. SPECIFICATIONS 1936 FOR HIGH TENSILE STRENGTH, QUENCHED CARBON BOLTS WITH SQUARE HEADS, EXTRA HEAVY SQUARE NUTS, NUT LOCKS, ROLLED STEEL ANGLE WASHERS AND HEAD LOCKS. MANG. HOLES 1/4" LARGER THAN FROG BOLT DIA.

PLATES – THICKNESS 1". FURNISHED ONLY WHEN SPECIFIED. FOOT GUARDS FURNISHED BY R.R.

WORKMANSHIP AND MATERIALS – A·R·E·A· SPECIFICATIONS FOR GENERAL TRACKWORK.

NOTES – ON FROG CASTING FOR 100#-112#-115#-130#-131# RAILS.

BOLT SHROUDS TO BE ELIMINATED. CROSS RIBS BETWEEN THE SIDE WALLS TO BE S-SHAPED. CROSS RIBS TO BE ATTACHED TO SIDE WALLS ONLY AND TO BE PLACED APPROXIMATELY EVERY SECOND BOLT SPACING AND OCCUR BETWEEN BOLT HOLES.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

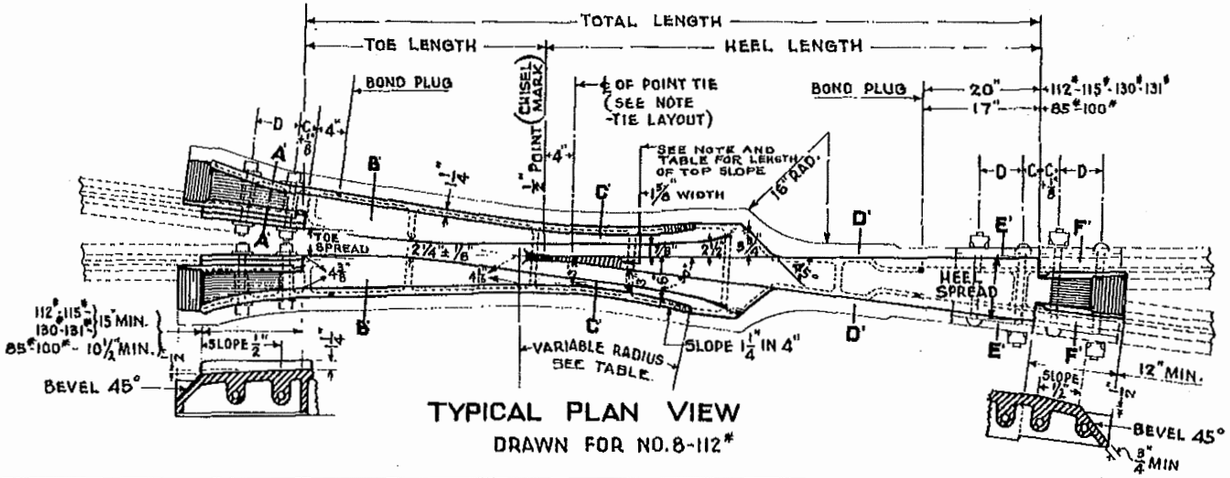
DWG. NO. 2520

Nov. 17, 1986. (1)
ISSUE DATE ISSUE NO.

B & M NO. 20 RAILBOUND MANGANESE STEEL FROG

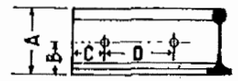
Daniel Bram
ENGINEERING OFFICER

Wa Ram Ralli
CHIEF ENGINEERING OFFICER



TYPICAL PLAN VIEW

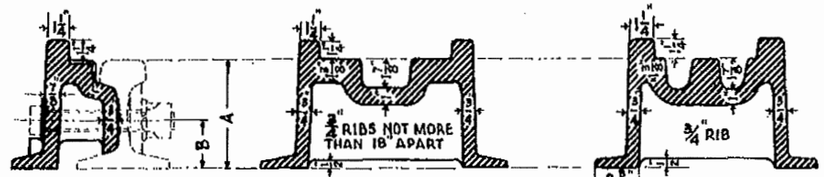
DRAWN FOR NO.8-112#



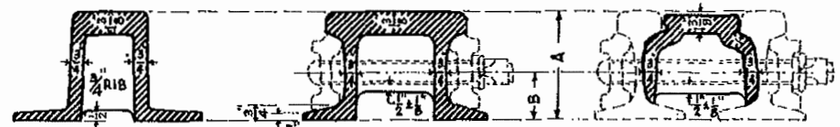
RAIL DRILLING FOR JOINTS					DIAM. OF HOLE	JOINT BOLT DIAM. OVER THROS
WEIGHT	A	B	C	D		
85#	5 5/16"	2 17/64"	2 15/16"	6"	1 3/32"	15/16"
100#	6"	2 33/64"	2 1/16"	7"	1 1/32"	1 1/16"
112#	6 5/8"	2 7/8"	2 1/2"	6 1/2"	1 1/4"	1 1/8"
130#	6 3/4"	3 1/16"	2 11/32"	5 1/2"	1 1/4"	1 1/8"
131#	7 1/8"	3 1/32"	2 1/2"	6 1/2"	1 1/4"	1 1/8"
115#	6 5/8"	2 7/8"	3 1/2"	6"	1 1/4"	1 1/8"

FROG LENGTHS

FROG		85# RAIL						* 100# RAIL						112#, 115#, 130#, 131# RAILS					
NO.	ANGLE	TOTAL LGTH	TOE LGTH	TOE SPRD	HEEL LGTH	HEEL SPRD	VAR. RAD.	TOTAL LGTH	TOE LGTH	TOE SPRD	HEEL LGTH	HEEL SPRD	VAR. RAD.	TOTAL LGTH	TOE LGTH	TOE SPRD	HEEL LGTH	HEEL SPRD	VAR. RAD.
6	9°-31'-38"	5'-5"	20"	2 1/16"	3'-9"	8"	4'-9"	5'-8"	21"	3"	3'-11"	8 5/16"	4'-10"	7'-4"	2'-11"	5/16"	4'-5"	9 7/16"	5'-0"
7	8°-10-16"	6'-3"	23"	2 1/32"	4'-4"	7 15/16"	6'-8"	6'-7"	2'-0"	2 1/16"	4'-7"	8 5/8"	6'-8"	6'-1½"	2'-11"	4½"	5'-2½"	9 11/32"	7'-0"
8	7°-09-10"	7'-3"	2'-3"	2 1/8"	5'-0"	8"	8'-9"	7'-7"	2'-4"	3"	5'-3"	8 5/8"	8'-10"	8'-11"	2'-11"	3 3/8"	6'-0"	9½"	9'-2"
9	6°-21-35"	8'-1"	2'-6"	2 13/16"	5'-7"	7 15/16"	11'-2"	8'-5"	2'-7"	2 11/16"	5'-10"	8¼"	11'-3"	9'-9"	2'-11"	3 5/8"	6'-10"	9 11/32"	11'-6"
10	5°-43-29"	8'-11"	2'-9"	2 15/16"	6'-2"	7 7/8"	13'-11"	9'-4"	2'-10"	2 23/32"	6'-8"	8 5/16"	14'-0"	11'-4½"	3'-9"	4"	7'-7½"	9 5/8"	14'-8"



SECTION A-A SECTION B-B SECTION C-C



SECTION D-D SECTION E-E SECTION F-F

NOTES:

DESIGN, DETAILS AND CONSTRUCTION SHALL CONFORM TO THE PLANS ADOPTED BY THE AMERICAN RAILWAY ENGINEERING ASSOCIATION AS RECOMMENDED PRACTISE.

REFERENCES TO A.R.E.A. TRACKWORK PLANS:— #640-DATA AND SECTIONS. #600 B-FROG POINT AND FLANGEWAY.

BOLTS-FURNISHED WITH FROG. A.S.T.M. SPECIFICATION A50 FOR HIGH TENSION CARBON BOLTS, EXTRA HEAVY SQUARE NUTS, NUT LOCKS, ROLLED STEEL ANGLE WASHERS AND HEAD LOCKS.

BOLT HOLES-DIAMETER OF HOLES IN CASTINGS TO BE 1/16" LARGER THAN DIAMETER OF BOLTS.

BOND PLUGS-INSERTS OF ¾" SOFT STEEL IN VERTICAL WALLS. TO BE DRILLED WITH 13/16" HOLES AND PLUGGED TIGHTLY AT ONCE WITH LEAD RIVETS.

JOINT BARS-AT TOE TO BE FURNISHED WITH FROG. AT HEEL TO BE FURNISHED BY RAILROAD.

PLATES- FURNISHED ONLY WHEN SPECIALLY ORDERED.

MARKING-FROGS TO BE MARKED WITH NUMBER-WEIGHT OF RAIL AND MANUFACTURER'S NAME.

WORKMANSHIP AND MATERIAL-A.R.E.A. SPECIFICATIONS FOR GENERAL TRACKWORK.

TIE LAYOUTS FOR ALL SOLID MANG. SELF GUARDED FROGS- CENTER LINE OF POINT TIE IS 4" FROM THE 1" POINT TOWARDS HEEL OF FROG. ALL OTHER TIES ARE SPACED 19½ CENTER TO CENTER FROM THIS TIE.

*FOR #8, #9, #10-100# FROGS - FURNISH RACOR INTEGRAL BASE SOLID MANGANESE STEEL SELF GUARDED FROG PER RAMAPO-AJAX PLAN (3206-H)

NOTE:—ACTUAL FROG POINT TO BE 1/16" BELOW WING LEVEL; SLOPING TO ZERO AT 1⅝" WIDTH OF POINT.

FROG NO.	TOP SLOPE LENGTH
6	6 3/16"
7	7 7/8"
8	9"
9	10 1/8"
10	11¼"

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

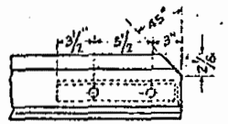
DWG. NO. 2530

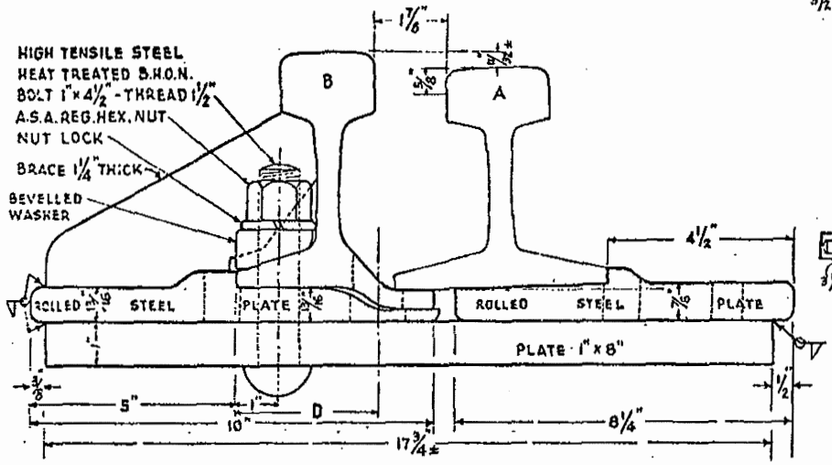
Nov. 17, 1986 (1)

ISSUE DATE ISSUE NO.

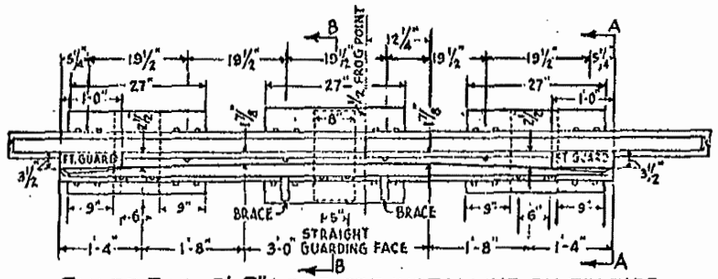
B & M SOLID MANGANESE STEEL SELF GUARDED FROGS

Daniel Brown — ENGINEERING OFFICER

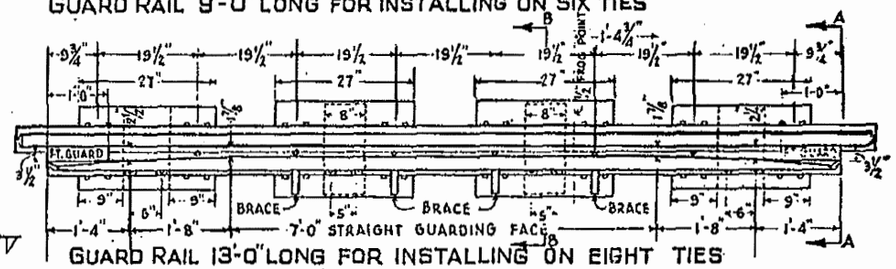
W.A. Ramsdell — CHIEF ENGINEERING OFFICER

DETAIL OF BEVELED ENDS
SHOWING FOOT GUARD



SECTION B-B THRU CENTER PLATE



GUARD RAIL 9'-0" LONG FOR INSTALLING ON SIX TIES

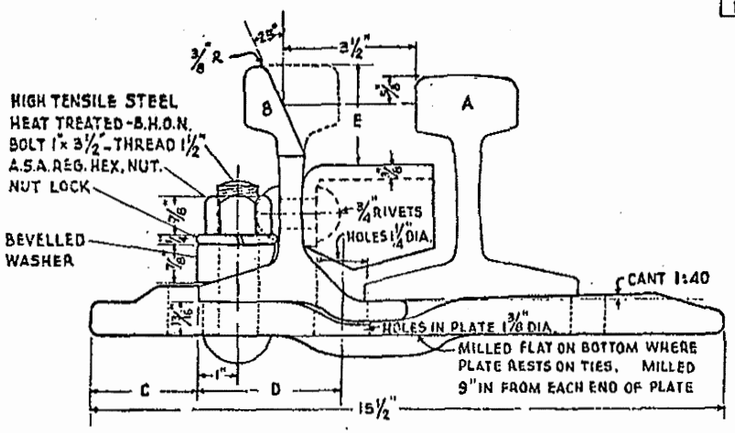


GUARD RAIL 13'-0" LONG FOR INSTALLING ON EIGHT TIES

RAIL A	RAIL B	C	D	E
85 ASCE	GT 96 R.E	2⅞"	3 5/16"	2⅜"
100 N.H	GT 96 R.E	2¼"	4 1/16"	2⅛"
112-115 R.E	GT 104 R.E	2⅝"	3 5/16"	2⅛"
130 R.E.	GT 104 R.E	2⅝"	3 11/16"	2⅛"
131 R.E.	GT 120 R.E	2⅝"	3⅞"	2⅛"

PLACING OF HOOK FLANGE GUARD RAILS

NUMBER OF FROG	LENGTH OF GUARD RAIL	PLACE GUARD RAIL ON TIES NO	PLACE PT. OF FROG ON TIE NO	FOR TIE REFERENCE SEE STD. PLAN NO.
RIGID FROGS				
8	9 FT.	36 TO 41 INC	39	F 8
9	" "	38 " 43 "	41	F 13
10	" "	42 " 47 "	45	F 9
12	13 "	52 " 59 "	57	F 12
15	" "	70 " 77 "	75	F 10
20	" "	85 " 92 "	90	F 11
SPRING RAIL FROGS				
8	9 FT.	36 TO 41 INC	39	F 8
10	13 "	40 " 47 "	45	F 9
12	" "	52 " 59 "	57	F 12



SECTION A-A AT END PLATE

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

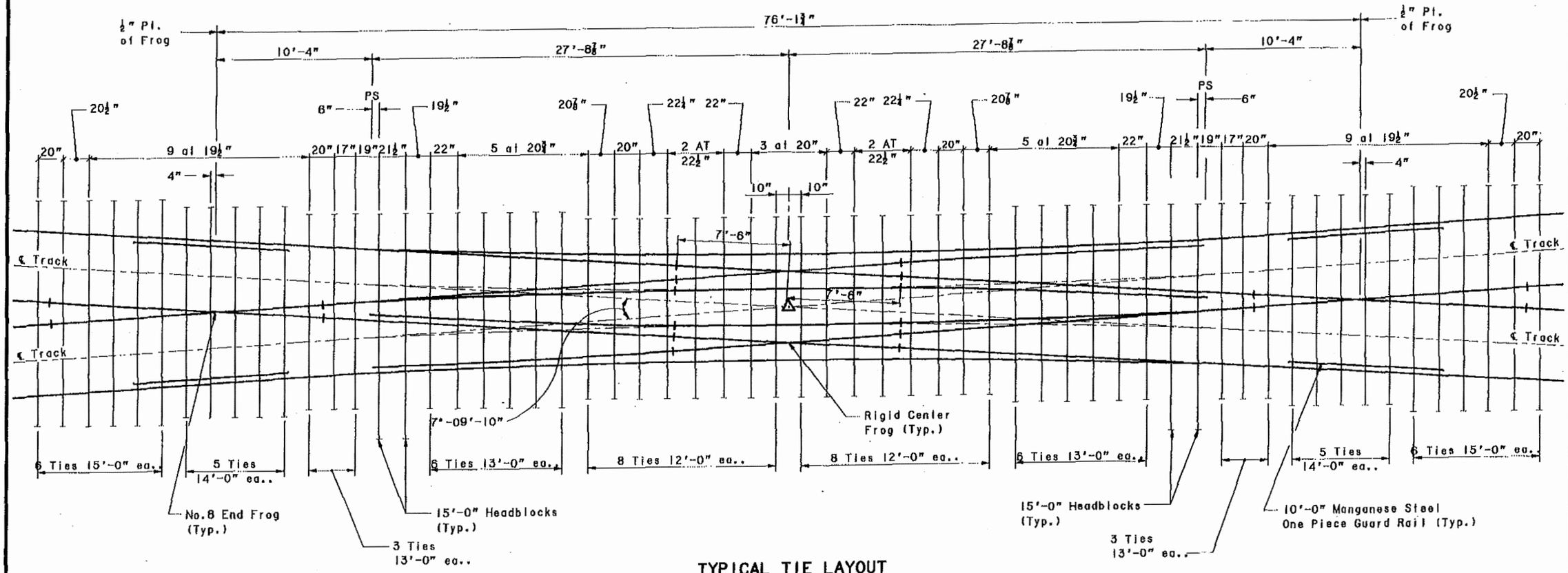
DWG. NO. 2540

Nov. 17, 1986 (1)
ISSUE DATE ISSUE NO.

B & M HOOK FLANGE GUARD RAILS

Daniel Brown
ENGINEERING OFFICER

W A Reinhold
CHIEF ENGINEERING OFFICER



TYPICAL TIE LAYOUT

Notes:

1. Length of headblock timbers and orientation dependent on switch machine type and field location as affected by other adjacent special trackwork units.
2. Additional (or less) long timbers may be required depending on size and location of other adjacent special trackwork units.
3. No rail welds shall be made within limits of double slip switches. All connections shall be bolted except heel ends of end frogs may be welded.
4. Insulated joints shall be bolted "Poly" type joints.
5. Location and number of insulated joints and other rail joints to be determined on a site specific basis.

LONG TIMBERS REQUIRED

Quantity	Length	
16	12'-0"	
18	13'-0"	
10	14'-0"	
12	15'-0"	
4	Headblocks	Note 1
60	total	Note 2

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

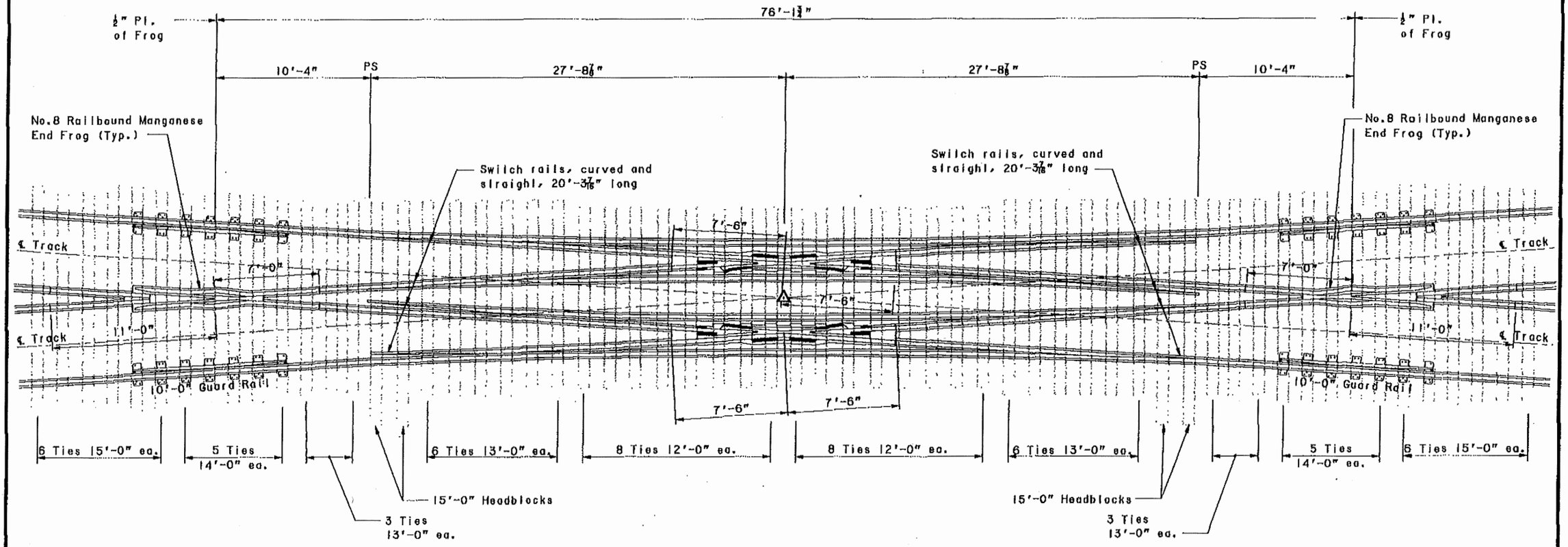
DWG. NO. 2602

JAN. 5, 1996 ISSUE DATE

1 ISSUE NO.

NO.8 DOUBLE SLIP/RIGID FROG TIE LAYOUT

John D. Pory
SECTION CHIEF



GENERAL LAYOUT

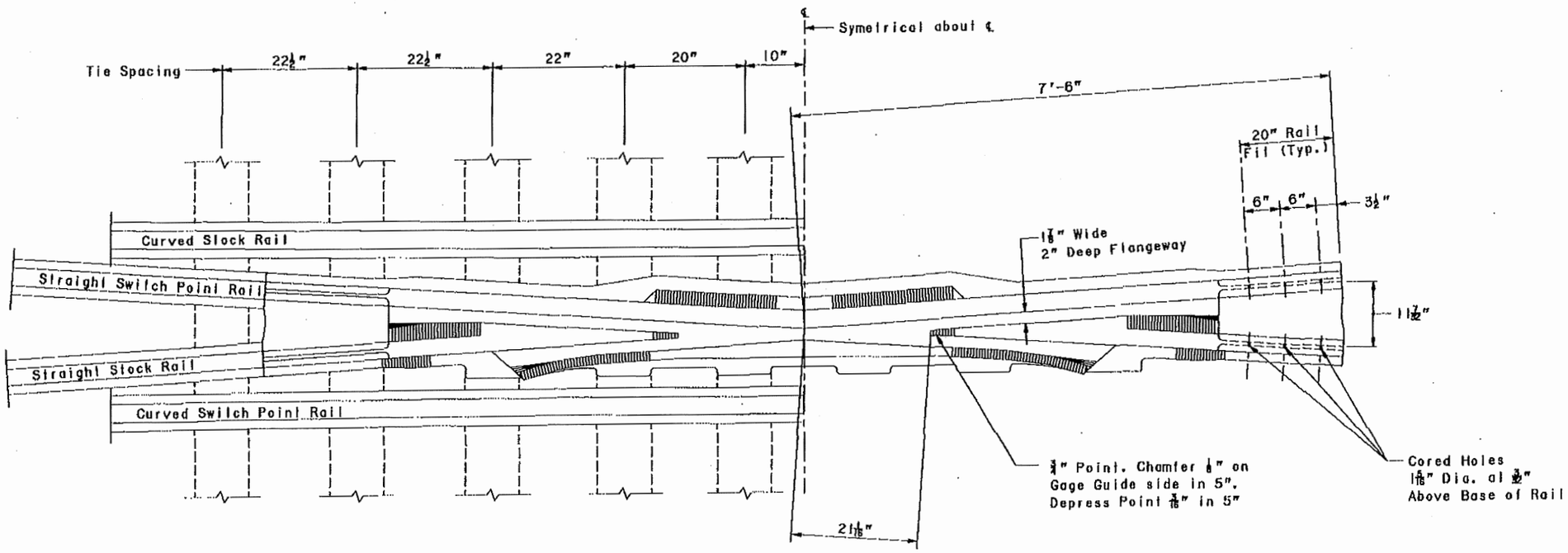
Notes:

1. 10'-0" Long One Piece Manganese Steel Guard Rails (4) per Standard Plan No. 2300.
2. No.8 Railbound Maganese Steel End Frogs (2) per Standard Plan No. 2084.
3. No.8, Rigid, Solid Manganese Center Frogs (2) per Standard Plan 2605.
4. Furnish not less than 2 Gage Plates spanning all rails at Center Frogs and 1 Gage Plate spanning all rails of both switch point locations.
5. Furnish 1:80 Cant Transition Tie Plates and Flat Plates as required on both ends of double slip.
6. Entire unit to be resiliently fastened except through guard rails.
7. All switch rods to be vertical.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2604 JAN. 5, 1996 (ISSUE DATE) 1 (ISSUE NO.)

NO.8 DOUBLE SLIP/RIGID FROG GENERAL LAYOUT

John D. Ray
CHIEF ENGINEER



CENTER FROG

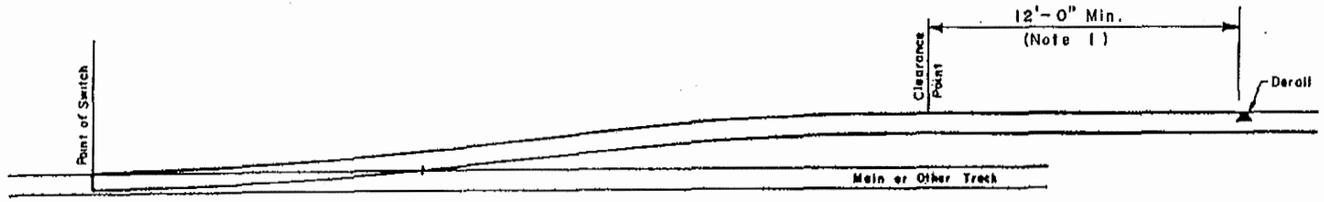
Notes:

1. Frog Angle is 7°-09'-10".
2. All Switch Point and Stock Rail Connections to Casting to be bolted, not welded.

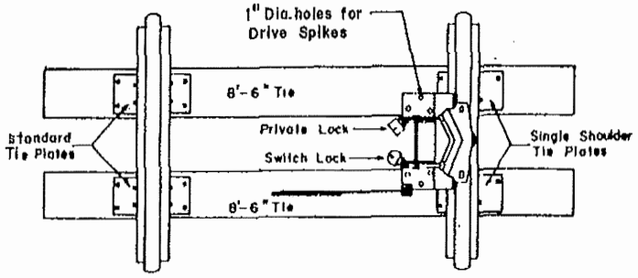
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2605
		jan. 5, 1996 (ISSUE DATE) / (1) (ISSUE NO.)

NO.8 DOUBLE SLIP/RIGID, SOLID MANGENESE CENTER FROG

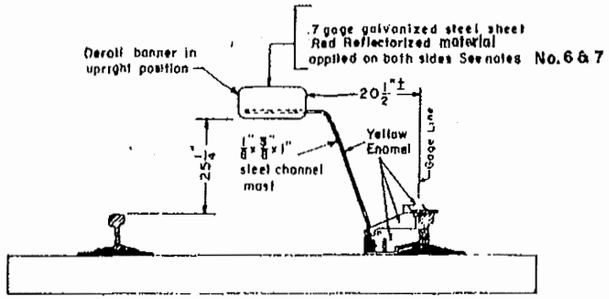
John D. Kay



LOCATION OF DERAIL

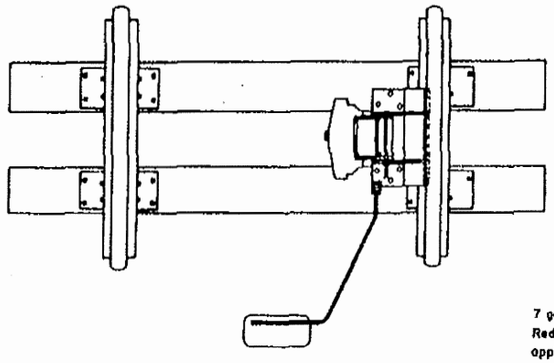


TOP VIEW

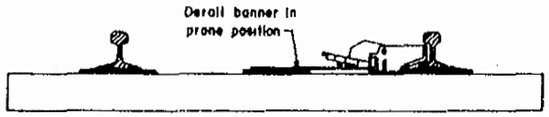

Derail banner in upright position
.7 gage galvanized steel sheet
Red Reflectorized material
applied on both sides See notes No. 6 & 7
20 1/2" ±
Yellow Enamel
1/8" x 3/8" x 1" steel channel mast
Gage Line
2 1/4"

SIDE VIEW

DERAIL IN "NORMAL POSITION"



TOP VIEW



SIDE VIEW

DERAIL IN "REVERSE POSITION"

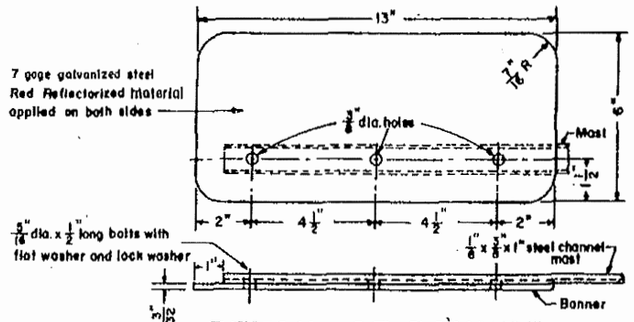
NOTE:

1. Derail shall be placed a sufficient distance back from the clearance point to assure that derailed rolling equipment will not foul main or other track(s).
2. Hinged block type derails to be used only on enginehouse ready and storage tracks.
3. When ordering derail specify size:

Size	Weight of Rail
5	70 to 100 lb.
6	90 to 110 lb.
7	110 to 140 lb.
8	140 to 155 lb.

4. Derail is to be painted yellow enamel over primer.
5. All derails to accomodate padlocks on both ends, one a switch lock; the other a private lock.
6. Reflectorized derail banners shall be used where high visibility is necessary and where not prohibited by public authorities having jurisdiction.
7. Reflectorized sheeting material shall conform and be applied in accordance with current and applicable Mass. Highway Dept. Standards.
8. Banners shall be fabricated from 7 gage galvanized steel sheet. as one contiguous piece (No Joints or Seams Allowed).
9. Shade of coloration shall be approved by the MBTA or their designated agent.
10. Should reflectorized material be prohibited, a red, fade resistant paint shall be applied over a rust inhibitive primer on the banner.

NOTE: The derail shown is manufactured by Western - Cullen - Hayes



DETAIL OF BANNER

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

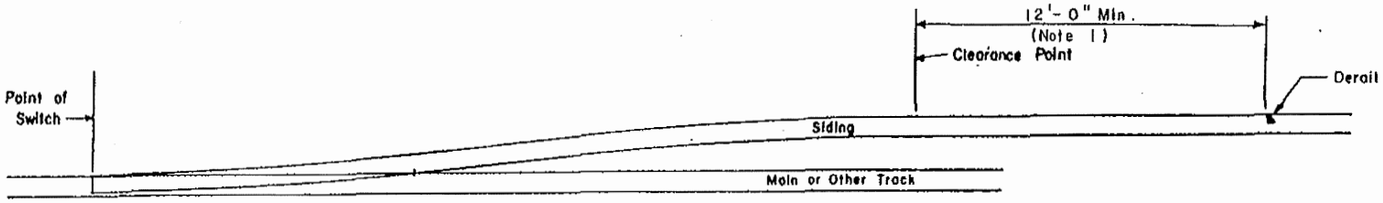
DWG. NO. 3000

Oct. 28, 1992 (ISSUE DATE) (1) (ISSUE NO.)

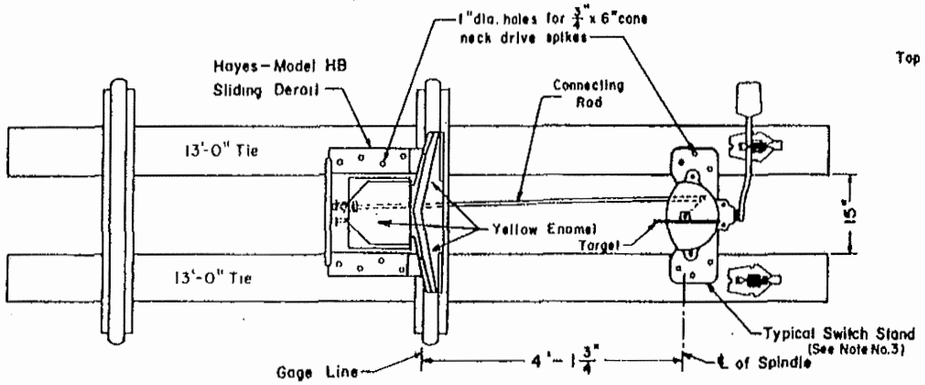
HINGED BLOCK DERAIL

John D. Ray
ENGINEERING OFFICER

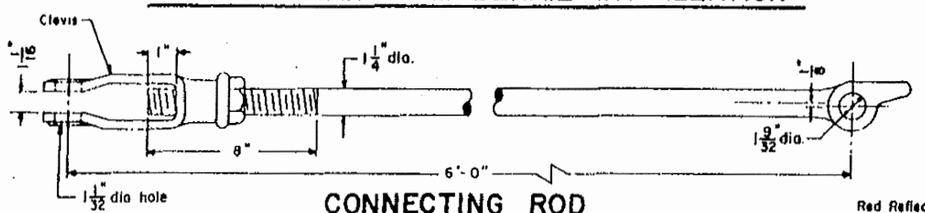
CHIEF ENGINEERING OFFICER



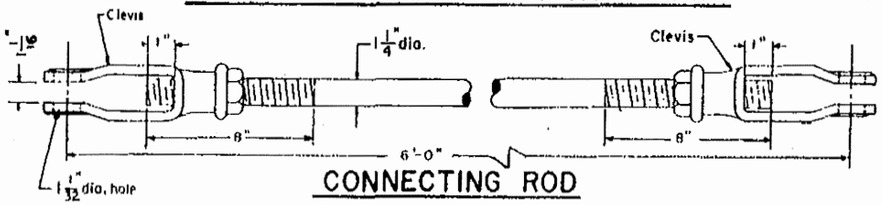
LOCATION OF DERAIL



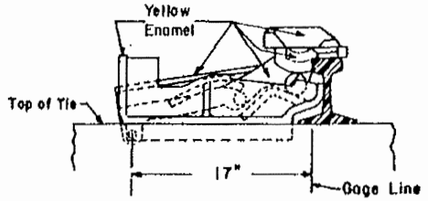
SWITCH STAND AND DERAIL INSTALLATION



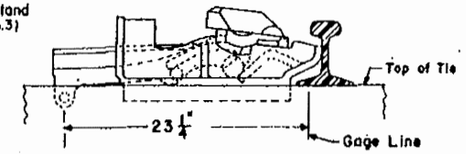
CONNECTING ROD FOR NEW CENTURY SWITCH STAND



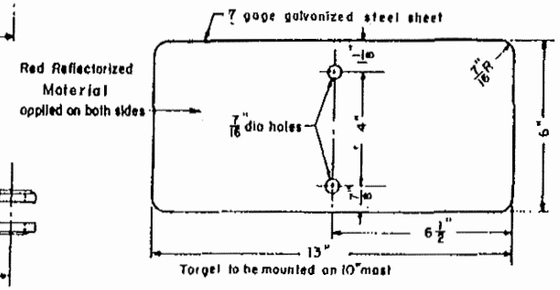
CONNECTING ROD FOR OTHER TYPES OF SWITCH STANDS



DERAIL IN "NORMAL POSITION"



DERAIL IN "REVERSE POSITION"



TARGET DETAILS

NOTES

1 - Derail shall be placed a sufficient distance back of the clearance point to make sure that derailed rolling equipment will not foul the main or other track.

2- The following switch stand is to be used to operate derail:- New Century Switch Stand, Model 50-A as manufactured by Bethlehem Steel.

Others as approved by Chief Engineering Officer.

3 - Switch stand to be in tension, with red target perpendicular to the rail, when the derail is in the normal position.

4 - When ordering derail specify-Model and Size

Size 6 -- for 90lb rail to 110lb rail
Size 7 - for 110lb rail to 140lb rail
Size 8 - for 140lb.rail to 155 lb rail

Order derails with double ended derailing flanges which will operate as either left or right hand derails.

5 - All orders should state that derails will be operated by switch stands having a 4 3/4" throw

6-All derails to accomodate padlocks on both ends, one a switch lock; the other a private lock.

7-Reflectorized derail banners shall be used where high visibility is necessary and where not prohibited by public authorities having jurisdiction.

8-Reflectorized sheeting material shall conform and be applied in accordance with current and applicable MHD Standards.

9-Banners shall be fabricated from 7 gage galvanized steel sheet as one contiguous piece (No Joints or Seams Allowed).

10-Shade of coloration shall be approved by the MBTA or their designated agent.

11-Should reflectorized material be prohibited, a red, fade resistant paint shall be applied over a rust inhibitive primer on the banner.

12-All items shown for maintenance of existing equipment, only.

13-This type of derail shall NOT be installed in new installations without the written approval of the Chief Engineering Officer of the MBTA.

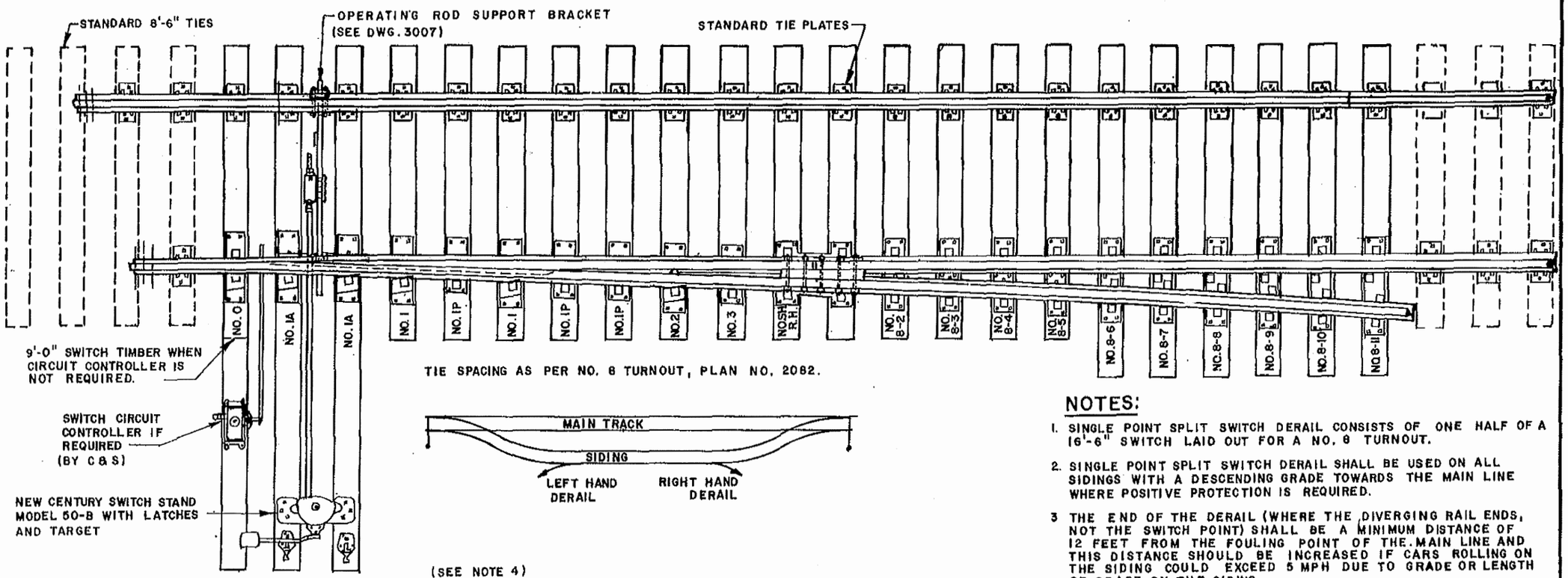
NOTE: The Derail Shown is Manufactured by Western-Cullen-Hayes.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3004
		Oct. 28, 1992 (1)
		ISSUE DATE / ISSUE NO.

SLIDING BLOCK DERAIL

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



NOTES:

1. SINGLE POINT SPLIT SWITCH DERAIL CONSISTS OF ONE HALF OF A 16'-6" SWITCH LAID OUT FOR A NO. 8 TURNOUT.
2. SINGLE POINT SPLIT SWITCH DERAIL SHALL BE USED ON ALL SIDINGS WITH A DESCENDING GRADE TOWARDS THE MAIN LINE WHERE POSITIVE PROTECTION IS REQUIRED.
3. THE END OF THE DERAIL (WHERE THE DIVERGING RAIL ENDS, NOT THE SWITCH POINT) SHALL BE A MINIMUM DISTANCE OF 12 FEET FROM THE FOULING POINT OF THE MAIN LINE AND THIS DISTANCE SHOULD BE INCREASED IF CARS ROLLING ON THE SIDING COULD EXCEED 5 MPH DUE TO GRADE OR LENGTH OF GRADE ON THE SIDING.
4. OTHER TYPE TIE PLATES, SUCH AS TWIN HOOKS BEHIND THE HEEL MAY BE SUBSTITUTED IN PLACE OF RESILIENT FASTENER TYPE SHOWN, PROVIDED THAT DERAIL IS NOT IN MAIN TRACK.
5. SWITCH STAND TO BE COMPLETE WITH 10'-0" OPERATING ROD PER PLAN 3020-1 WITH TWO LATCHES AND TARGET

(SEE NOTE 4)

BILL OF MATERIAL

*SUPPLIED BY THE INSTALLER

QUAN.	DESCRIPTION	Reference Plan No.
1	16'-6" SWITCH POINT (R.H. or L.H.) COMPLETE WITH REINFORCING BARS, CLIP FOR NO. 1 ROD AND STOPS	2104
1	HEEL BLOCK ASSEMBLY, COMPLETE	2350
1	39'-0" UNDERCUT STOCK RAIL (R.H. or L.H.)	2104
1	NO. 0 ADJUSTABLE BRACE SLIDE PLATES	2106
2	NO. IA " " " "	2106
2	NO. 1 " " " "	2106
1	NO. 2 " " " "	2106
3	NO. IP SHOULDER SLIDE PLATES	2106
1	NO. 3 " " "	2106
1	NO. SH HEEL PLATE (RH.or L.H.)	2106
1	SWITCH RAIL STOP	2350
1	ADJUSTABLE ROCKER CLIP FOR VERT. SWITCH RODS	2107
1	INSULATED VERTICAL SWITCH ROD (NO. 1 ONLY)	2107

QUAN.	DESCRIPTION	Reference Plan No.
10	TURNOUT PLATES FOR USE BEHIND HEEL (NO. 8-2 to 8-11)	2340
6	RESILIENTLY FASTENED ADJUSTABLE RAIL BRACES	2352
100	7" LOCK SPIKES	1216
13	5/8" x 6" AREA Spikes *	1210
44	RESILIENT FASTENER SPRING CLIPS - TYPE "E"	-
4	RESILIENT FASTENER SPRING CLIPS - TYPE MOD. "E"	-
1	NEW CENTURY SWITCH STAND MODEL 50-B COMPLETE WITH 10'-0" OPERATING ROD, 2 LATCHES & TARGET	3020
1	OPERATING ROD SUPPORT BRACKET	3007
3	16'-0" HEADBLOCKS (2 IF NO CIRCUIT CONTROLLER)	-
13	9'-0" SWITCH TIMBERS (14 " " " ")	-
6	10'-0" SWITCH TIMBERS	-
		-

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

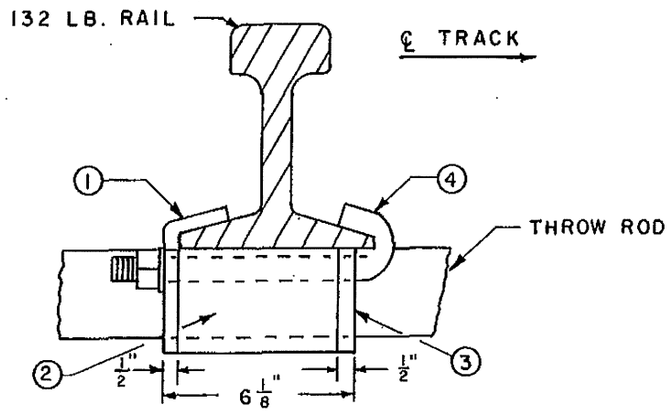
DWG. NO. 3006

Oct. 28, 1992 ISSUE DATE (1) ISSUE NO.

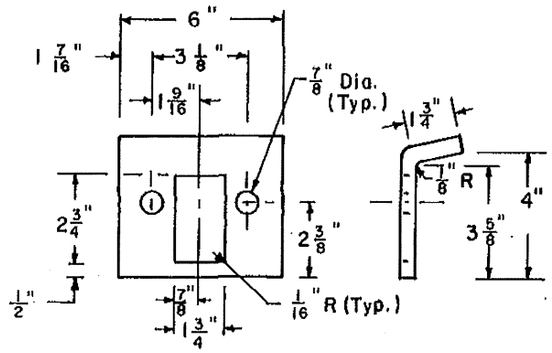
SPLIT SWITCH DERAIL

John D. Ray
ENGINEERING OFFICER

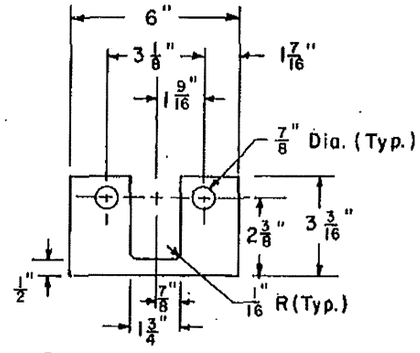
CHIEF ENGINEERING OFFICER



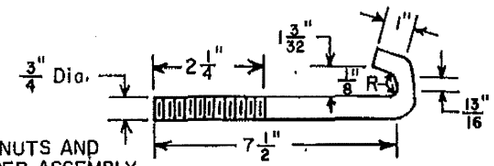
SIDE VIEW



① HEAD PLATE

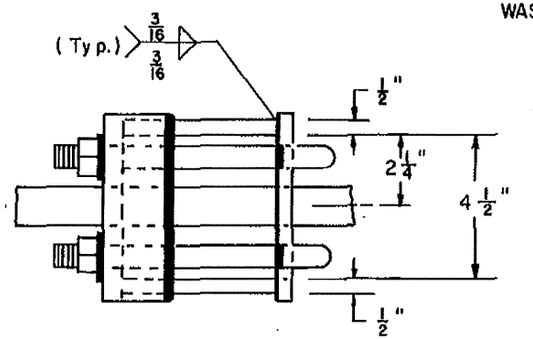


③ BACK PLATE

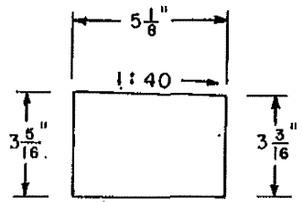


PROVIDE 2 NUTS AND WASHERS PER ASSEMBLY

④ HOOK BOLT
2 REQ'D.



PLAN VIEW



② SIDE PLATE
(2 Required)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

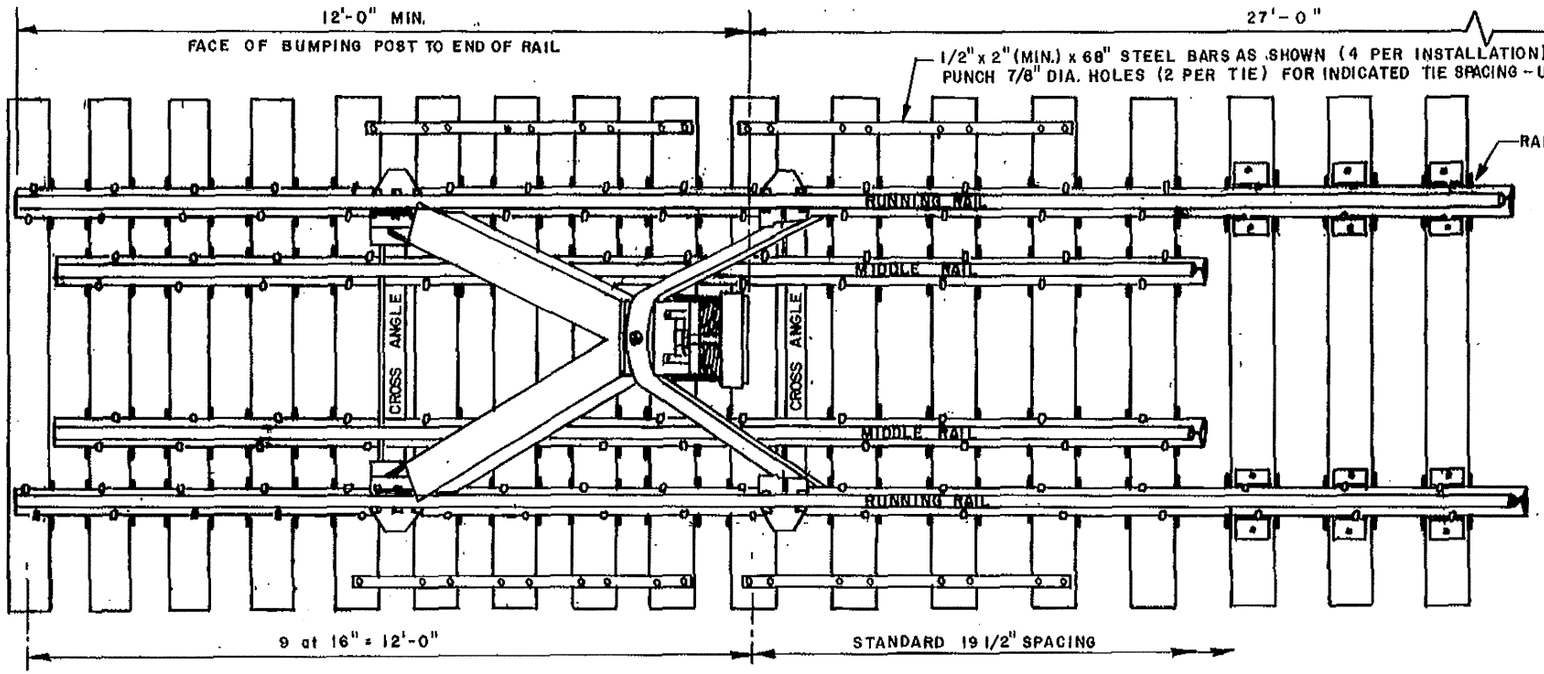
DWG NO. 3007

Oct. 28, 1992 (ISSUE DATE) (1) (ISSUE NO.)

OPERATING ROD SUPPORT BRACKET FOR SPLIT SWITCH DERAIL

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER


12'-0" MIN.
FACE OF BUMPING POST TO END OF RAIL
27'-0"
1/2" x 2" (MIN.) x 68" STEEL BARS AS SHOWN (4 PER INSTALLATION)
PUNCH 7/8" DIA. HOLES (2 PER TIE) FOR INDICATED TIE SPACING - USE 2-3/4" x 6" LAG SCREWS PER TIE.
RAIL ANCHORS (TYP.)
RUNNING RAIL
MIDDLE RAIL
CROSS ANGLE
CROSS ANGLE
MIDDLE RAIL
RUNNING RAIL
9 at 16" = 12'-0"
STANDARD 19 1/2" SPACING

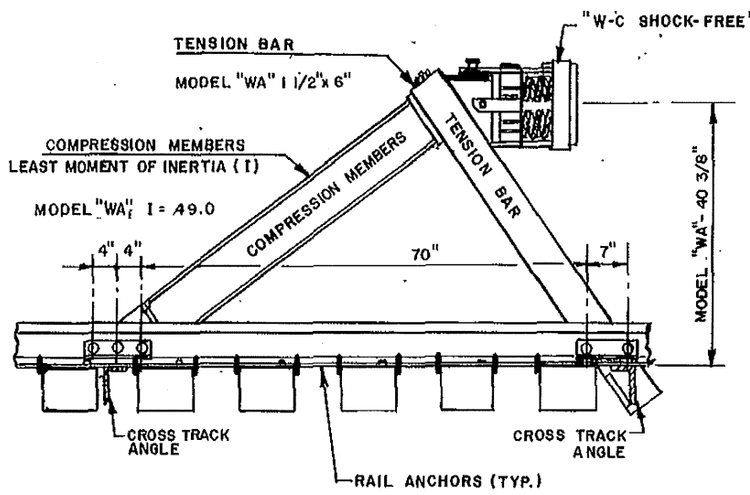
PLAN

INSULATED JOINTS

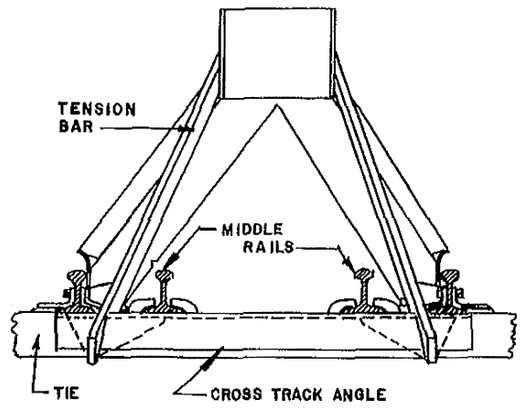
PROVIDE BOLTED POLY TYPE INSULATED JOINT ON ONE RAIL ONLY, 27'± (END OF RUNNING RAIL) FROM FACE OF BUMPING POST (IN SIGNALLED TRACK ONLY)

RAIL ANCHORS

BOX ANCHOR RUNNING RAILS AND MIDDLE RAILS ON EVERY TIE (EXCEPT WHERE CROSS ANGLES, ETC. PROHIBIT) AND FOR 200 FEET PAST FACE OF POST.



SIDE ELEVATION



FRONT ELEVATION

NOTES:

1. MODEL "WA" IS AN EXTRA HEAVY DESIGN (1655 lbs). USE ON ALL ENDS WHERE REVENUE PASSENGER SERVICE OPERATES EXCEPT AT MAJOR PASSENGER TERMINALS.
2. A MODEL "W-C SHOCK FREE" IMPACT ABSORBING HEAD (435 lbs) SHALL BE FURNISHED AND INSTALLED ON ALL BUMPING POSTS UNLESS OTHERWISE DIRECTED BY THE CHIEF ENGINEERING OFFICER.
3. END TIE PLATES 5 TIES AHEAD OF THE BUMPING POST.
4. THE MIDDLE RAILS SHOULD BE AT LEAST 19.5' LONG (1/2 RAIL LENGTH)
5. EACH RUNNING AND MIDDLE RAIL SHALL BE SPIKED TO EACH TIE WITH TWO CUT SPIKES (ONE ON EACH SIDE OF THE RAIL BASE).
6. THE INSTALLATION INSTRUCTIONS OF THE MANUFACTURER SHALL BE CAREFULLY & COMPLETELY FOLLOWED.
7. BUMPING POST SHOWN IS MANUFACTURED BY WESTERN-CULLEN-HAYES.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

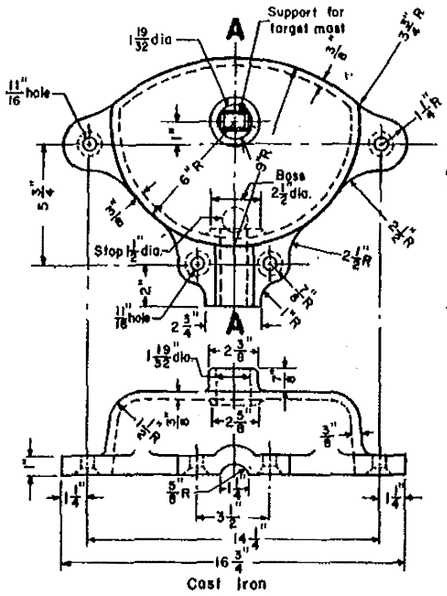
DWG. NO. 3010

Oct. 28, 1992 (1)
ISSUE DATE ISSUE NO.

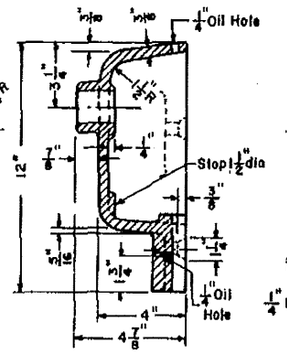
STEEL BUMPING POST

John D. Ray
ENGINEERING OFFICER

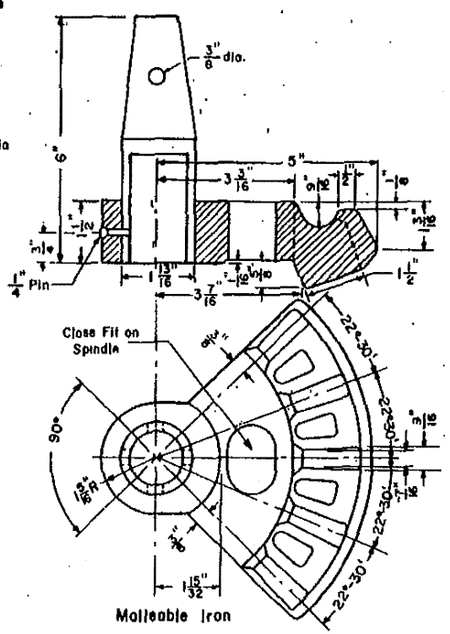
CHIEF ENGINEERING OFFICER



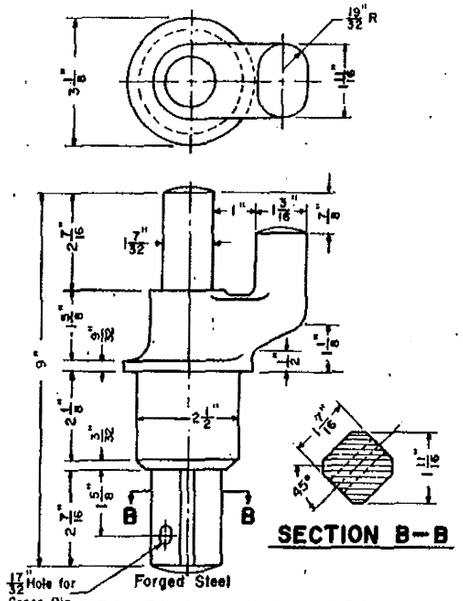
TOP OF SWITCH STAND - 50A



SECTION A–A

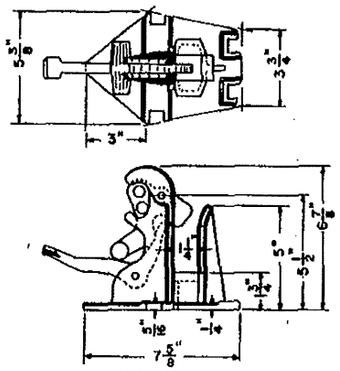


SEGMENT GEAR - 50A or 50B



SPINDLE - 50A or 50B

SECTION B–B

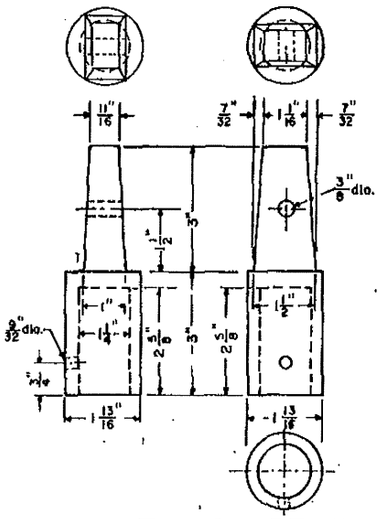


LATCH

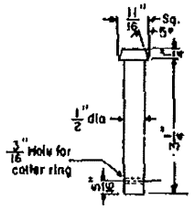
2 Required

NOTES:

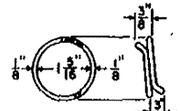
1. For additional details, see Plan 3020-2.
2. These switch stands are manufactured by Bethlehem Steel Corporation.
3. Model 50-A is a low type 10" high. Use in yards and terminals on switches that are not electrically locked and where there is limited clearance. Do not use on Mainline switches without specific authorization of the Chief Engineering Officer.
4. Model 50-B is an intermediate height stand. Use on Mainline switches and at all locations where there is sufficient side clearance for the required 16' long headblocks.
5. Throw in switch stand to be 5".



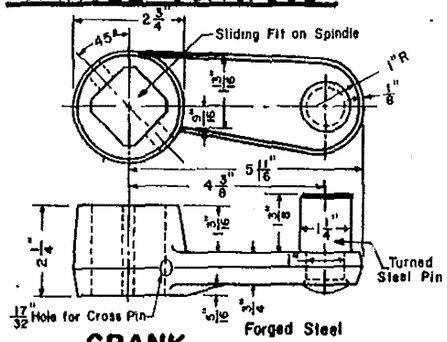
TARGET SUPPORT - 50A



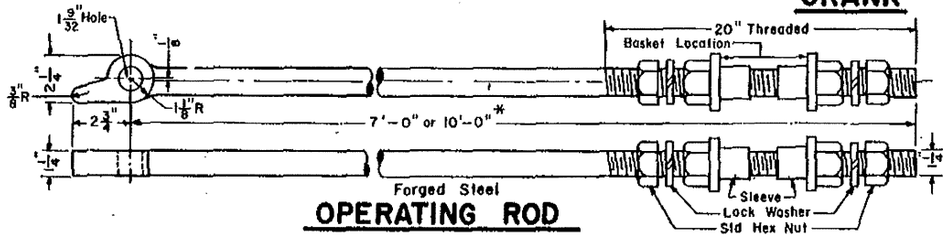
CROSS PIN



COTTER RING



CRANK



OPERATING ROD

*Provide 7'-0" rod with stand 50-A and 10'-0" rod with stand 50-B.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 3020-1

Oct. 28, 1992 (2)

ISSUE DATE ISSUE NO.

NEW CENTURY SWITCH STAND

INTERMEDIATE - MODEL 50-B

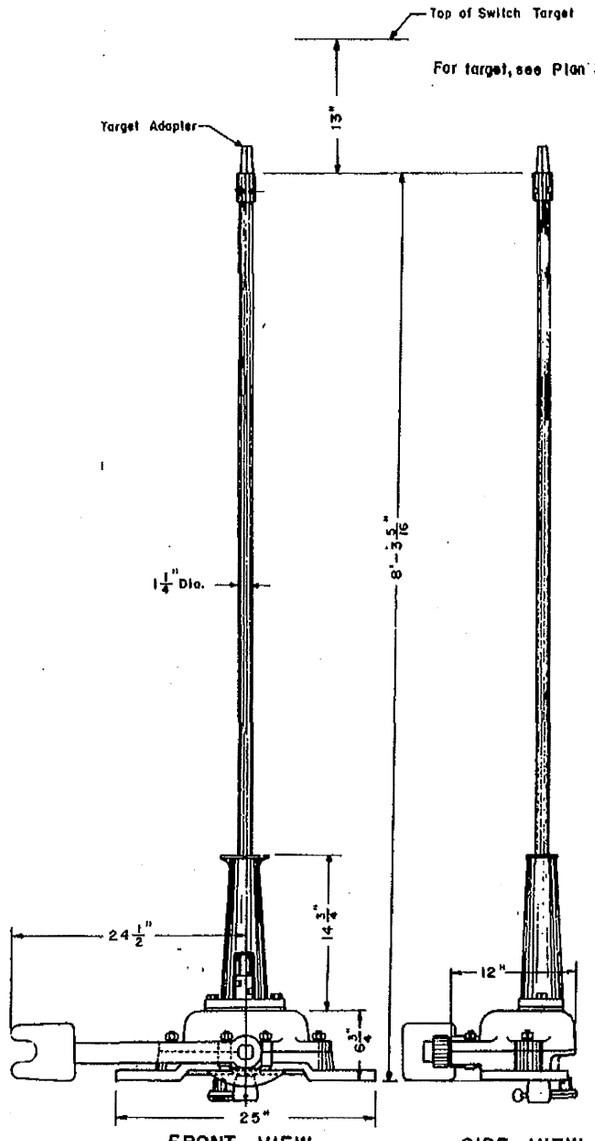
AND

LOW - MODEL 50-A

John D. Ray

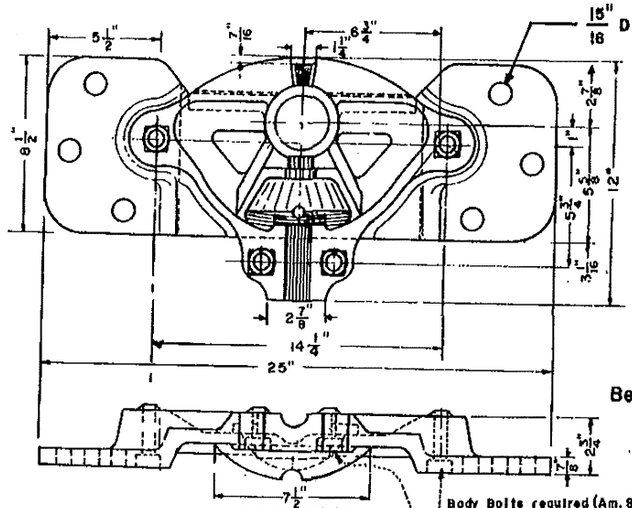
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



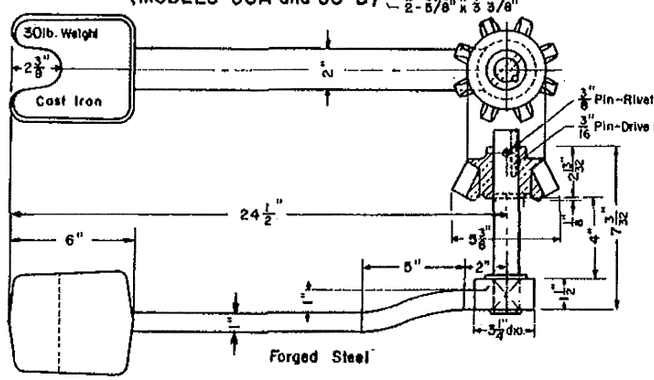
FRONT VIEW SIDE VIEW

MODEL 50-B

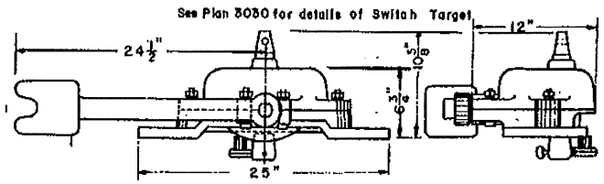


BOTTOM
(MODELS 50A and 50-B)

Body Bolts required (Am. Std. Heavy, Unfinished, Hex Heads and Nuts with Nutlocks):-
2-5/8" x 4"
2-5/8" x 3 3/8"



THROW LEVER FOR MODELS 50-A & 50-B

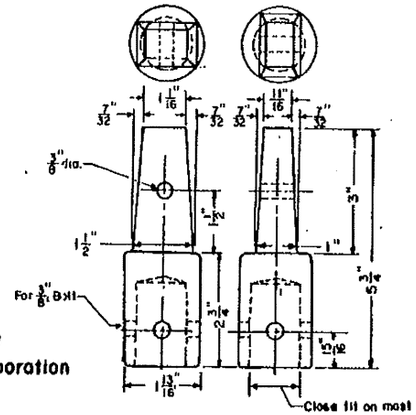


FRONT VIEW SIDE VIEW

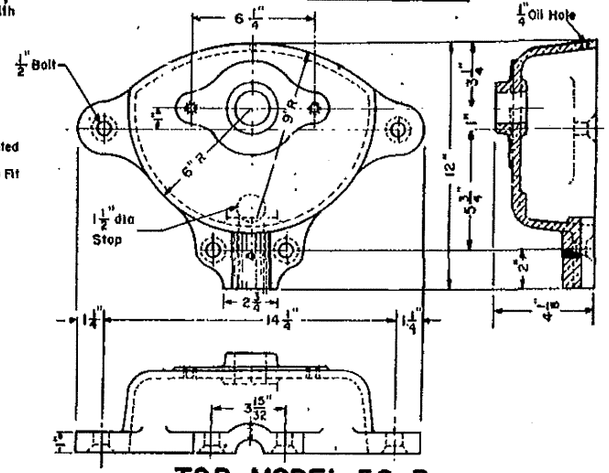
MODEL 50-A

FOR ADDITIONAL DETAILS, SEE PLAN 3020-1.

Manufactured By
Bethlehem Steel Corporation



TARGET ADAPTER
MODEL 50-B



TOP-MODEL 50-B

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 3020-2

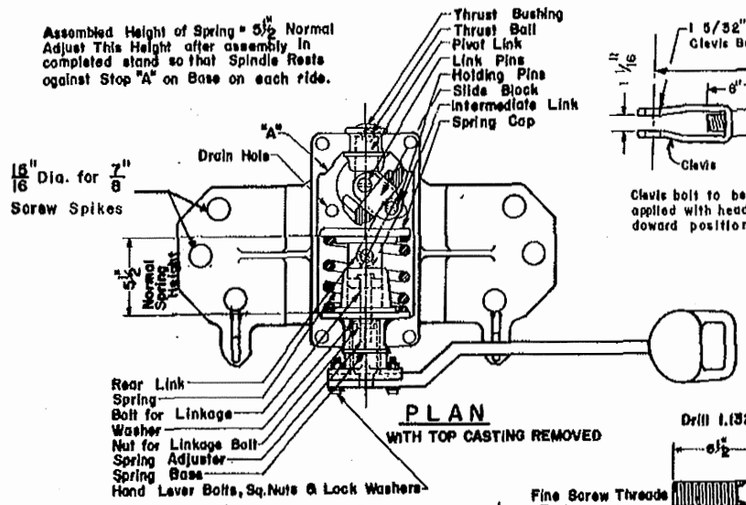
Oct. 28, 1992 (2)
ISSUE DATE ISSUE NO.

NEW CENTURY SWITCH STAND

INTERMEDIATE - MODEL 50-B
AND
LOW - MODEL 50-A

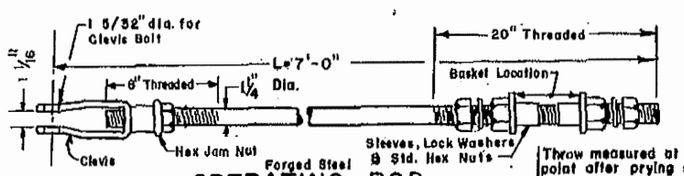
John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



PLAN

WITH TOP CASTING REMOVED

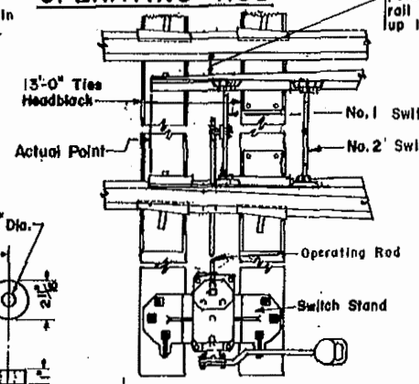


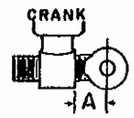
Forged Steel

OPERATING ROD

Clevis bolt to be applied with head in doward position.

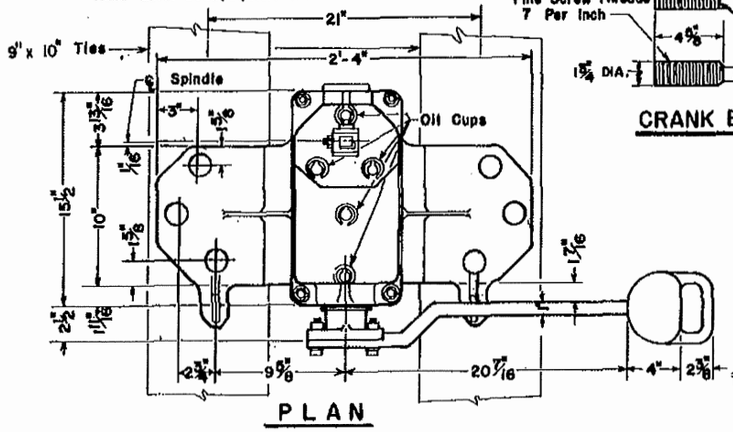
Throw measured at this point after prying switch point away from stock rail with bar to take up lost motion.



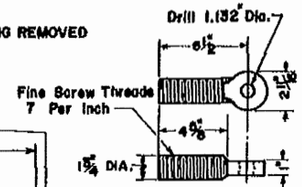


CRANK ADJUSTMENTS FOR RACOR SWITCH STANDS WITH SYMMETRICAL SPINDLE			
Throw of Switch	A	Throw of Switch	A
4½" *	2 1/16" *	5" Std.	2 7/16"
4 5/8"	2 3/16"	5 1/8"	2½"
4¾"	2¼"	5¼"	2 5/8"
4 7/8"	2 5/16"	5 3/8"	2 11/16"
5"	2 7/16"	5½"	2 13/16"

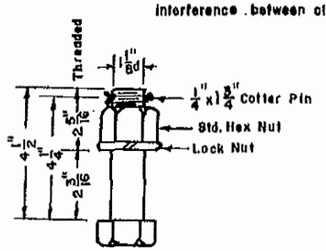
* Do not set crank less than 2 1/16", to avoid interference between clevis and spindle.



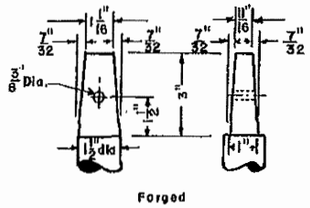
PLAN



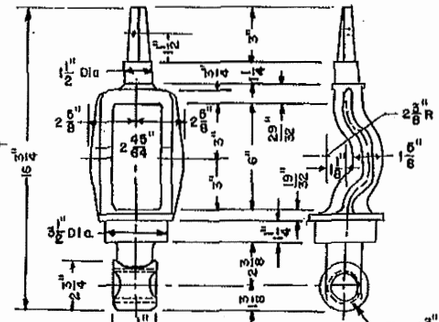
CRANK EYE



CLEVIS BOLT



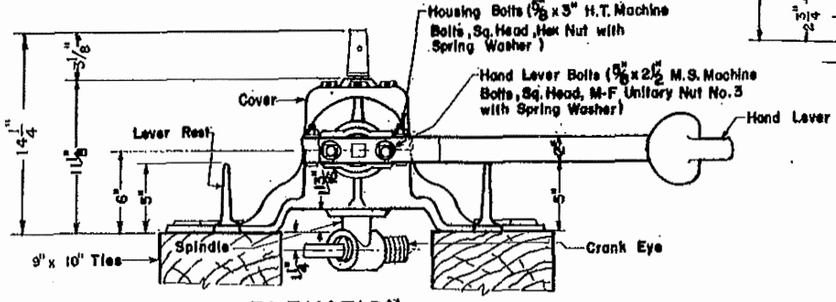
TOP OF SPINDLE DETAIL



SPINDLE

NOTES:

1. Style 22 is intended for use with "run through" switches allowing automatic operation of trailing point movements through the turnout.
2. Style 22 is for use in Yard Tracks only.
3. Use good grade of engine oil, with graphite content preferred. SAE 60 FOR SUMMER, SAE 40 FOR WINTER.
4. Installation of this switch stand shall be carefully done, following the instructions of the manufacturer.
5. Paint external surfaces with bright red/orange paint over primer.


Housing Bolts (5/8" x 3" H.T. Machine Bolts, Sq. Head, Hex Nut with Spring Washer)
Hand Lever Bolts (5/8" x 2½" M.S. Machine Bolts, Sq. Head, M-F Unitary Nut No. 3 with Spring Washer)
Cover
Lever Rest
Hand Lever
14 1/4"
11 3/8"
6"
5"
Spindle
9" x 10" Ties
Crank Eye

ELEVATION

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 3023

Oct. 28, 1992 (2)

ISSUE DATE ISSUE NO.

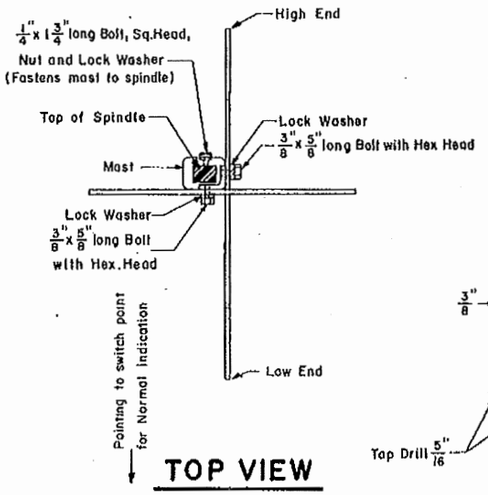
LOW SWITCH STAND RACOR - STYLE - 22

John D. Ray
ENGINEERING OFFICER

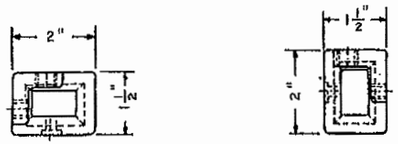
CHIEF ENGINEERING OFFICER

NOTES:

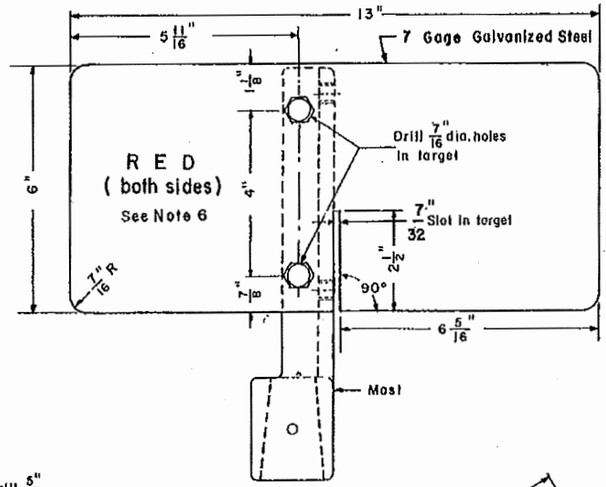
1. Targets shall be 7 gage Galvanized Steel Sheet.
2. All corners and edges of masts and targets shall have a smooth finish.
3. The steel surface of the targets shall be thoroughly cleaned with Oakite 33 before the application of reflectorized Scotchlite
4. Scotchlite shall be applied to both surfaces following the manufacturer's instructions completely using a heat and vacuum process.
5. Care must be exercised when sliding targets into slots and fastening them to the mast to reduce the possibility of damaging the Scotchlite material.
6. COLOR
   Red - No. 2872 Red Hi-Intensity Scotchlite
   Green - No. 2877 Green Hi-Intensity Scotchlite



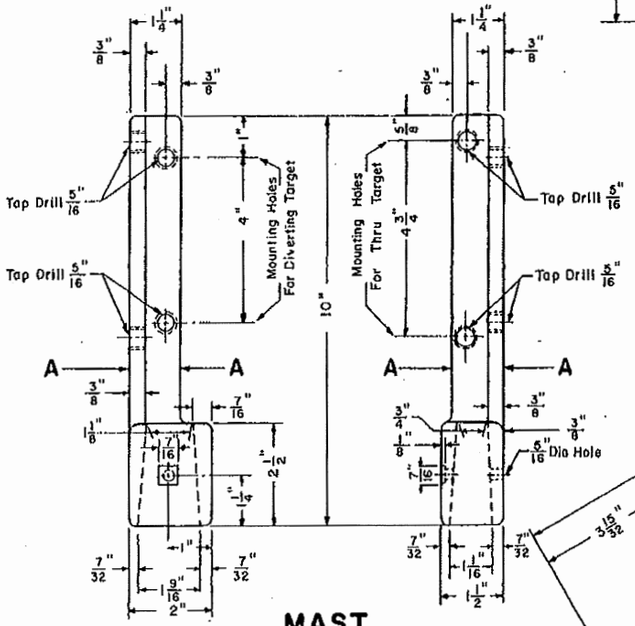
TOP VIEW



TOP VIEWS

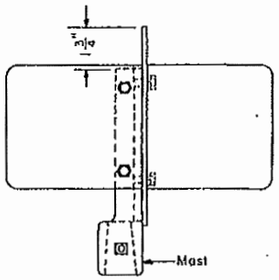


INDICATION - REVERSE TARGET DETAIL

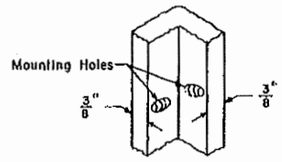


MAST

Cast Aluminum

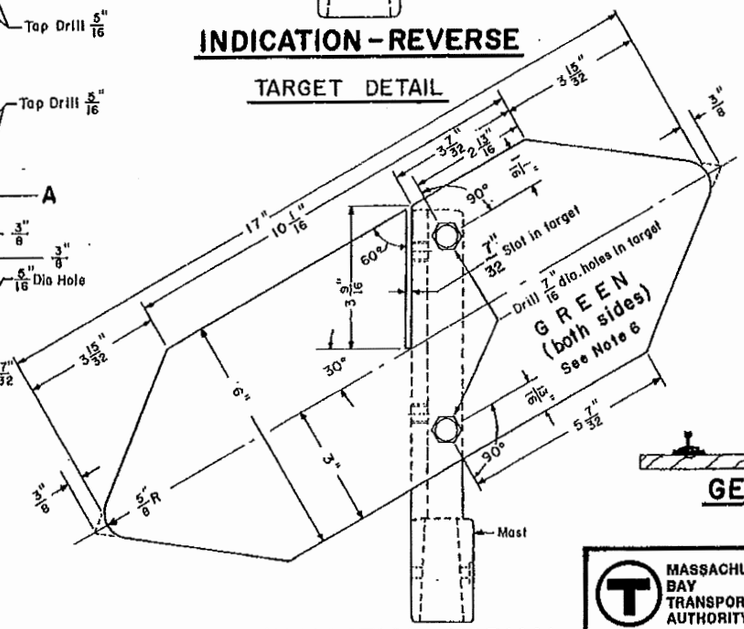


SIDE VIEW

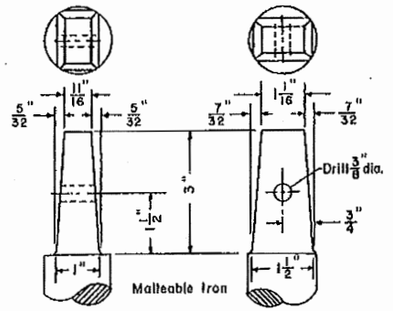


A-A

VIEW AT MOUNTING HOLES



INDICATION - NORMAL TARGET DETAIL



TOP OF SPINDLE

GENERAL APPLICATION

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

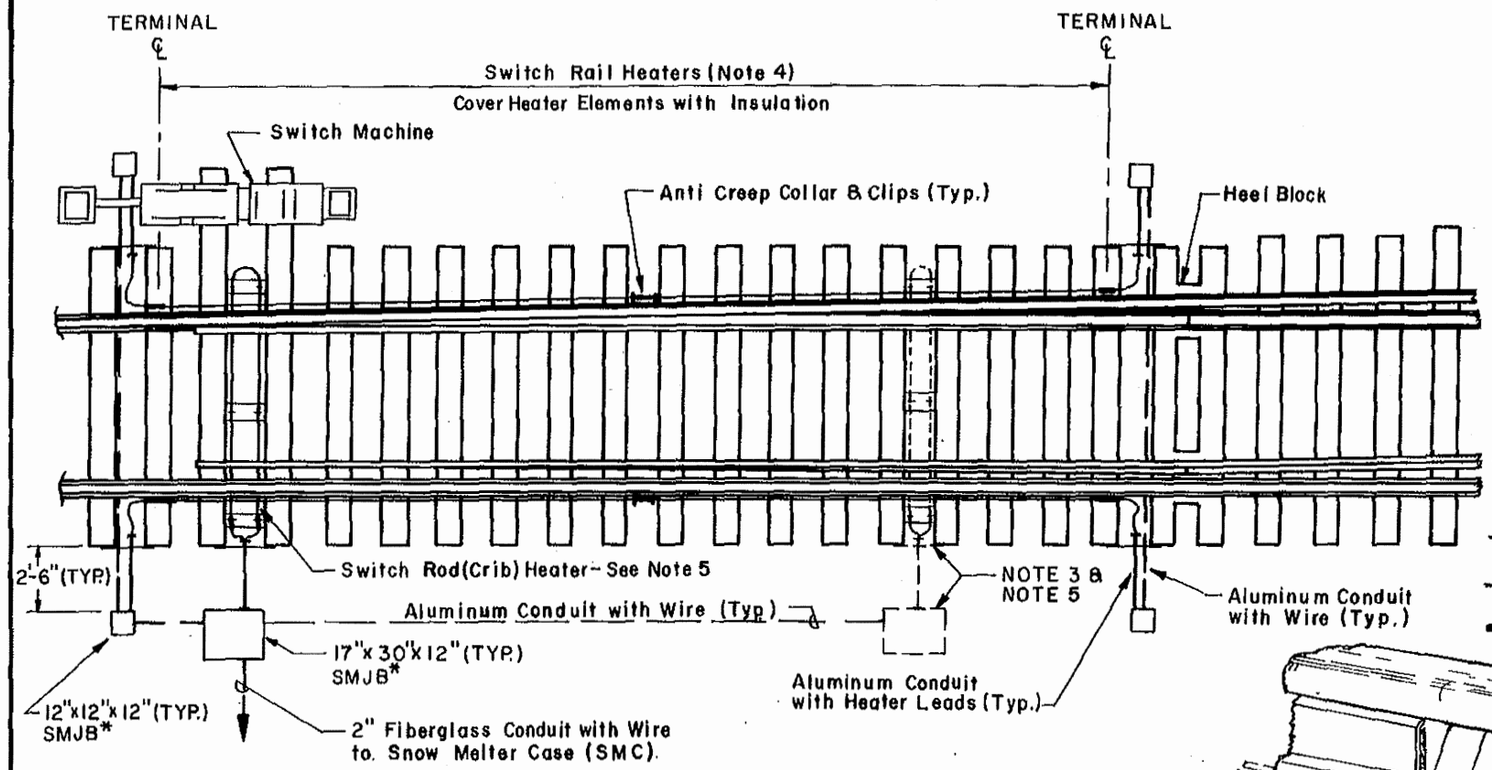
DWG. NO. 3030

Oct. 28, 1992 (2)
ISSUE DATE ISSUE NO.

SWITCH STAND TARGET

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



TYPICAL SNOWMELTER LAYOUT

NOTES:

1. All mounting hardware including snap-on clips, bolts, nuts and washers shall be hot dipped galvanized or stainless steel.

2. All snowmelter elements shall be provided complete with fastening hardware.

3. For a No. 20 layout, add a crib heater in the helper rod bay and a snow melter junction box.

4. At operationally critical locations, dual switch rail and crib heaters shall be installed as directed.

5. Brackets supporting the crib heaters shall be installed 6 1/2" below the base of rail. The area under the crib heaters must be clear and sloped for drainage of the crib.

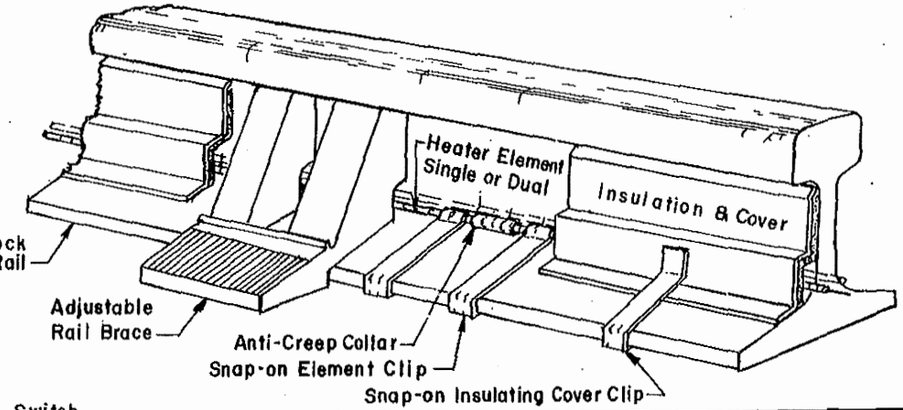
LEGEND

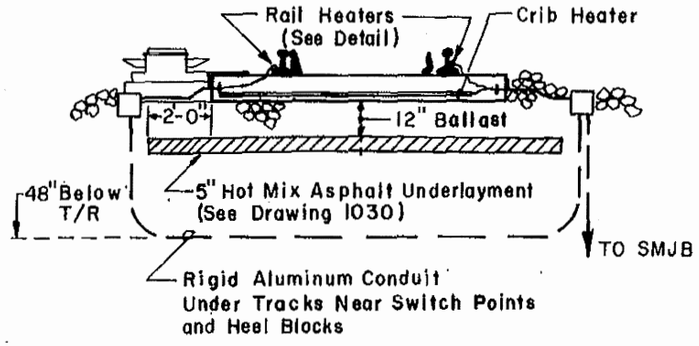
* SMJB = Snowmelter Junction Box

= Aluminum Conduit with Heater Leads

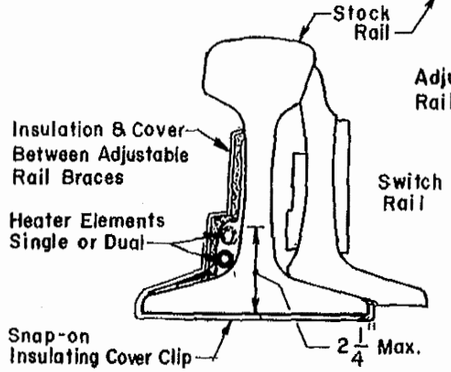
= Aluminum/Fiberglass Conduit with Wire

= Switch rod/Rail Heaters with Sealed Terminals




Rail Heaters (See Detail)
Crib Heater
2'-0"
12" Ballast
48" Below T/R
5" Hot Mix Asphalt Underlayment (See Drawing 1030)
TO SMJB
Rigid Aluminum Conduit Under Tracks Near Switch Points and Heel Blocks

TYPICAL SECTION


Insulation & Cover Between Adjustable Rail Braces
Heater Elements Single or Dual
Switch Rail
Snap-on Insulating Cover Clip
2 1/4" Max.

DETAIL AT RAIL HEATER INSTALLATION

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 3040

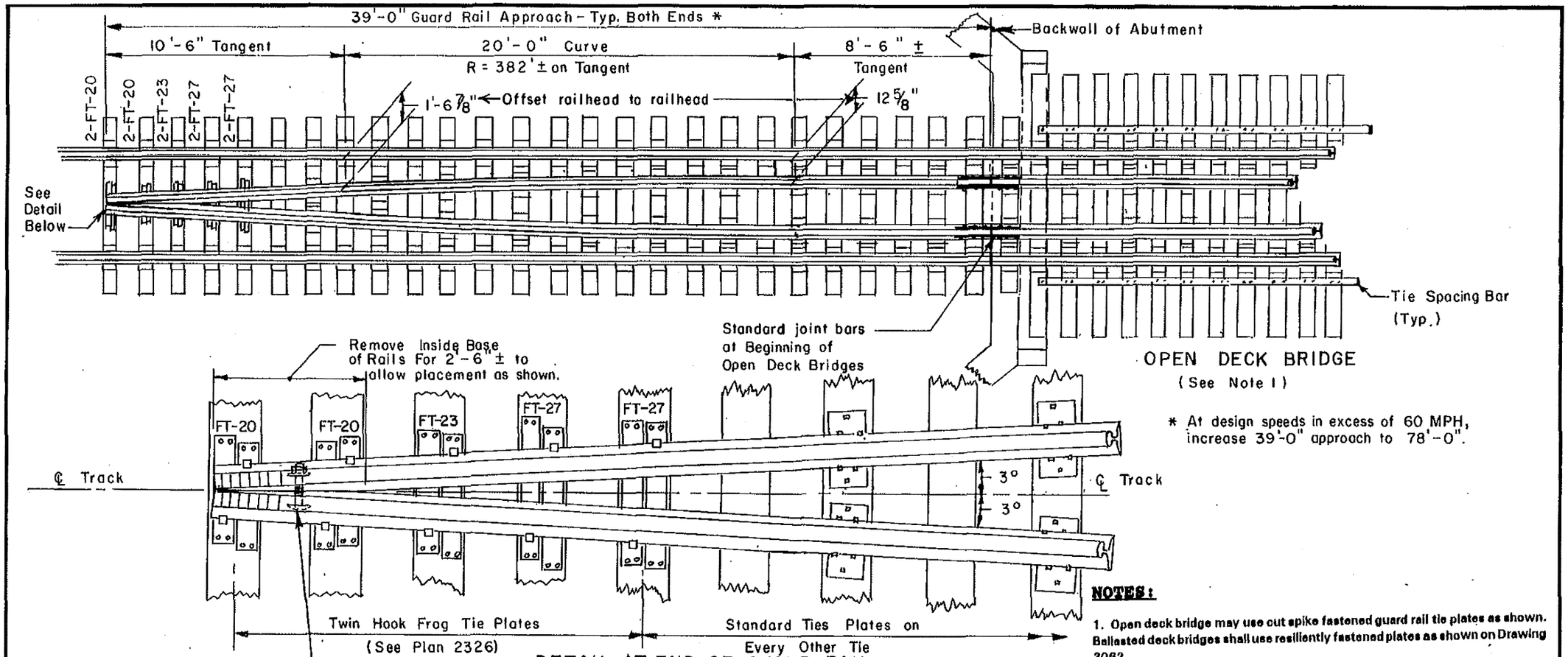
Jan. 5, 1996 (2)

ISSUE DATE ISSUE NO.

TYPICAL SNOWMELTER LAYOUT

John D. Ray

SECTION CHIEF



NOTES:

1. Open deck bridge may use cut spike fastened guard rail tie plates as shown. Ballasted deck bridges shall use resiliently fastened plates as shown on Drawing 3062.

2. Guard rails shall be used on all through girder and through truss bridges regardless of span length and on any bridge where the structure length exceeds 40 feet.

3. Guard rails shall be plated on every other tie but otherwise shall be fully spiked and jointed with 36" joint bars the same as with running rails.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

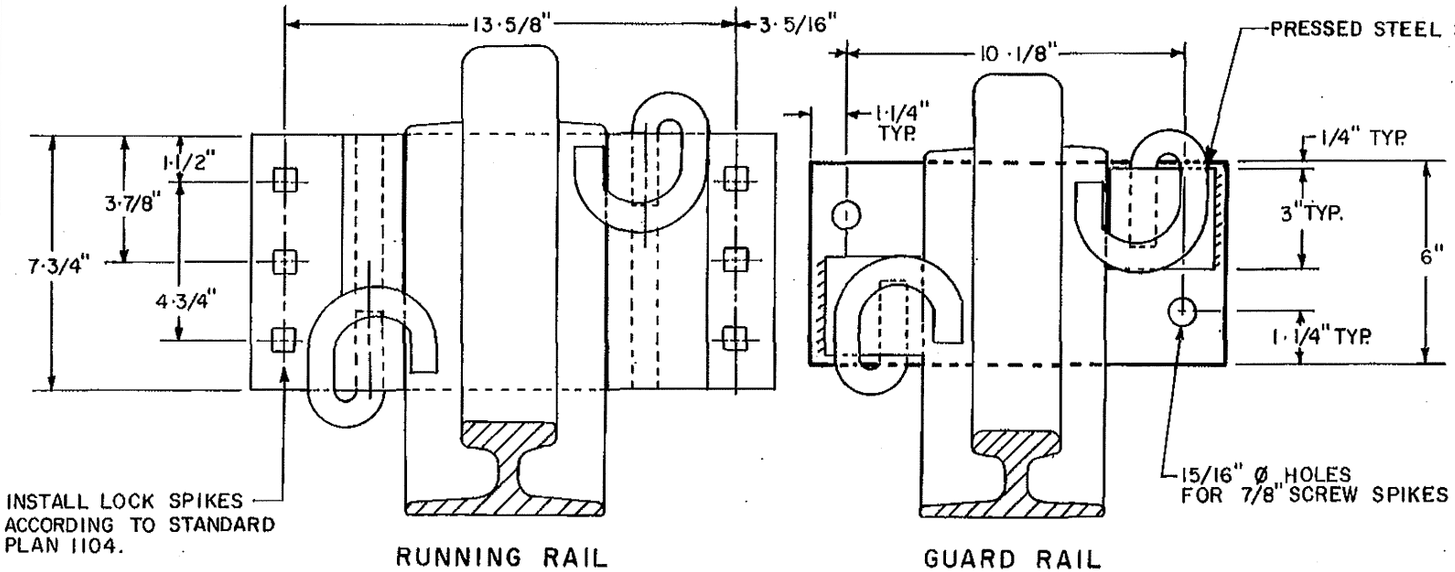
RAILROAD OPERATIONS

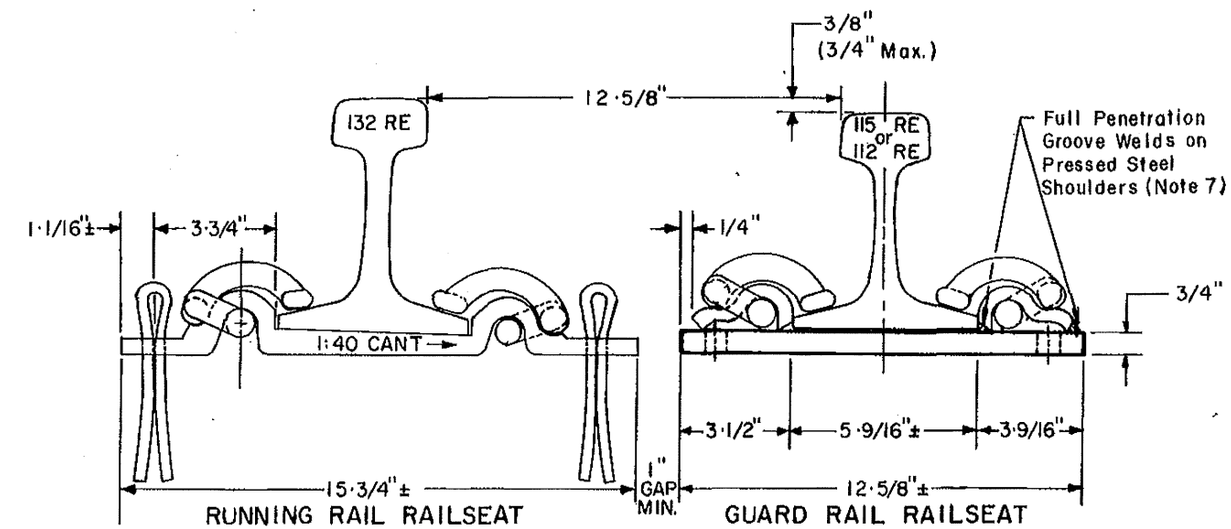
DWG. NO. 3060

Jan. 5, 1996 (3)
ISSUE DATE ISSUE NO.

GUARD RAIL ON BRIDGES

John D. Ray
SECTION CHIEF





CONSISTS OF: TIEPLATE – PER STANDARD DRAWING 1224
LOCKSPIKES – PER STANDARD DRAWING 1216
RAIL CLIPS – (2)

CONSISTS OF: TIEPLATE – PER THIS DETAIL
LOCKSPIKES – (2)
PRESSED STEEL SHOULDERS (2)
RAIL CLIPS – (2)

NOTES:

1. This installation shall be used on ballasted deck bridges with timber ties.
2. For additional details of guard rail installation, see Drawing No. 3060.
3. Tie plates shall conform to current AREA specifications.
4. Guard rail plates shall be branded to designate the section, three letters or a trademark to indicate the producer and two figures being the last year rolled. Lettering shall be on the gage side of the plate.
5. Material shall be ASTM A-36 steel.
6. Guard rail railseats shall be placed on every other tie unless otherwise specified.
7. Welds shall be made so as not to interfere with the installation of the rail or the rail clips.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

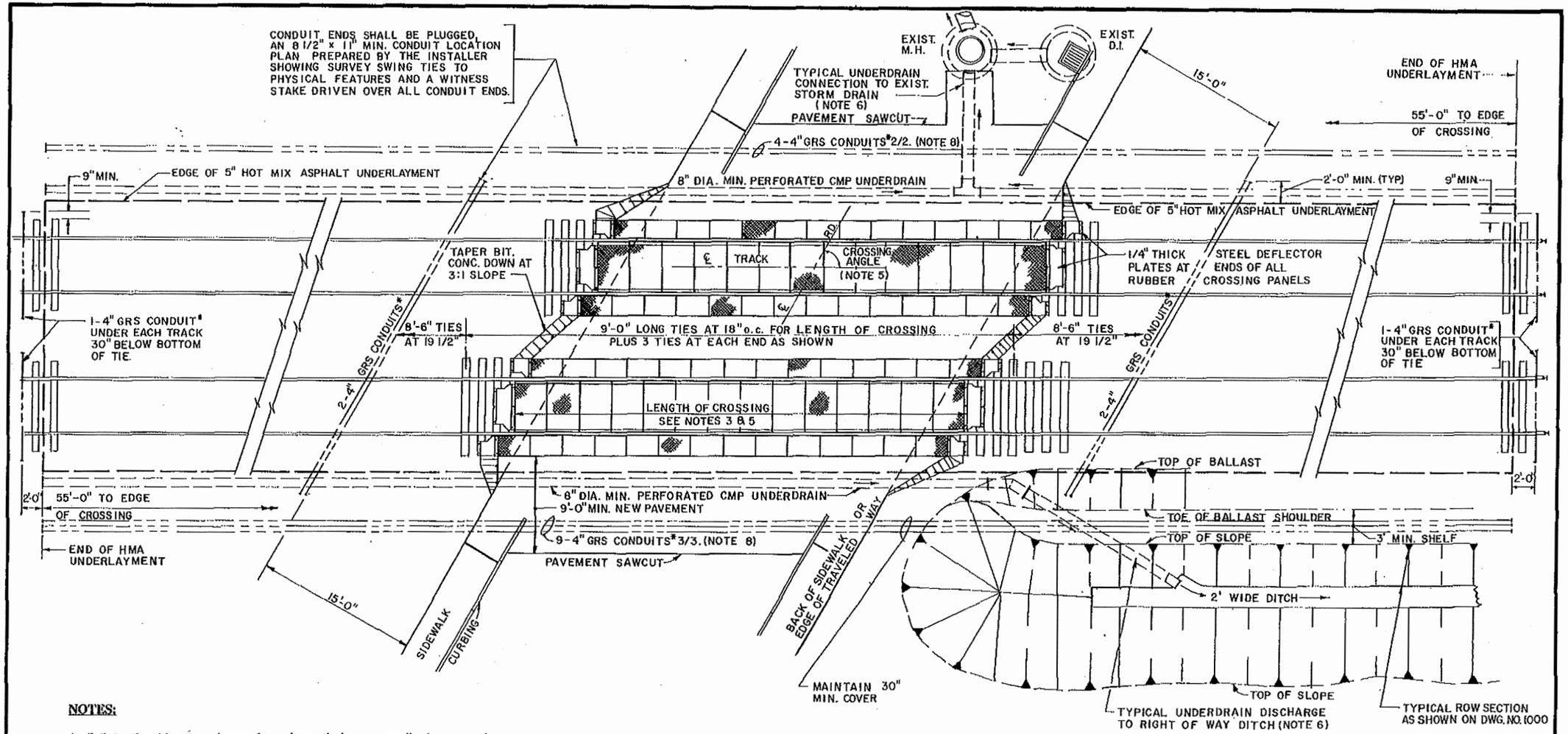
RAILROAD OPERATIONS

DWG. NO. 3062

Jan. 5, 1996 (2)
ISSUE DATE ISSUE NO.

RESILIENTLY FASTENED BRIDGE GUARD RAIL

John D. Ray
SECTION CHIEF


CONDUIT ENDS SHALL BE PLUGGED. AN 8 1/2" x 11" MIN. CONDUIT LOCATION PLAN PREPARED BY THE INSTALLER SHOWING SURVEY SWING TIES TO PHYSICAL FEATURES AND A WITNESS STAKE DRIVEN OVER ALL CONDUIT ENDS.
EXIST. M.H.
EXIST. D.I.
TYPICAL UNDERDRAIN CONNECTION TO EXIST. STORM DRAIN (NOTE 6)
PAVEMENT SAWCUT
4-4" GRS CONDUITS* 2/2. (NOTE 8)
END OF HMA UNDERLAYMENT
55'-0" TO EDGE OF CROSSING
15'-0"
9" MIN.
EDGE OF 5" HOT MIX ASPHALT UNDERLAYMENT
8" DIA. MIN. PERFORATED CMP UNDERDRAIN
2'-0" MIN. (TYP)
9" MIN.
EDGE OF 5" HOT MIX ASPHALT UNDERLAYMENT
TAPER BIT. CONC. DOWN AT 3:1 SLOPE
℄ TRACK
CROSSING ANGLE (NOTE 5)
1/4" THICK RUBBER PLATES AT ENDS OF ALL CROSSING PANELS
STEEL DEFLECTOR
1-4" GRS CONDUIT* UNDER EACH TRACK 30" BELOW BOTTOM OF TIE
8'-6" TIES AT 19 1/2"
9'-0" LONG TIES AT 18" o.c. FOR LENGTH OF CROSSING PLUS 3 TIES AT EACH END AS SHOWN
8'-6" TIES AT 19 1/2"
2-4" GRS CONDUITS*
2-4" GRS CONDUITS*
1-4" GRS CONDUIT* UNDER EACH TRACK 30" BELOW BOTTOM OF TIE
LENGTH OF CROSSING SEE NOTES 3 & 5
TOP OF BALLAST
2'-0"
2'-0"
55'-0" TO EDGE OF CROSSING
8" DIA. MIN. PERFORATED CMP UNDERDRAIN
9'-0" MIN. NEW PAVEMENT
9-4" GRS CONDUITS* 3/3. (NOTE 8)
PAVEMENT SAWCUT
TOE OF BALLAST SHOULDER
TOP OF SLOPE
3' MIN. SHELF
END OF HMA UNDERLAYMENT
15'-0"
SIDEWALK
CURBING
BACK OF SIDEWALK OR EDGE OF TRAVELED WAY
2' WIDE DITCH
MAINTAIN 30" MIN. COVER
TOP OF SLOPE
TYPICAL UNDERDRAIN DISCHARGE TO RIGHT OF WAY DITCH (NOTE 6)
TYPICAL ROW SECTION AS SHOWN ON DWG. NO. 1000

NOTES:

1. Full depth rubber crossing surface shown is for use on all primary road crossings. Low traffic volume installations to use rubber rail seal with bituminous surface.

2. For section and additional details of full depth rubber crossing, see Dwg. No. 3106. For rubber rail seal crossing, see Dwg. No. 3108.

3. Length of crossing to be the first multiple of 3' beyond the edge of traveled way (back of sidewalk) on each end.

4. Full depth rubber crossing surfaces shall be of a design which allows installation without bolting or lagging from the top surface into the ties. All crossing material must be designed to install over the standard resilient fastener system.

5. Stagger the crossing panels (as shown) in multiples of 18" (tie spacing) when the crossing angle is less than 65°±.

6. Underdrains should outlet to either R.O.W. ditches or exist. storm drains. If either method is not possible, consider a drywell.

7. Do not use subgrade underdrains to carry water in ditches through the crossing area. Use separate storm drains for this purpose.

8. The side of R.O.W. to receive the 9 GRS conduits to be determined by Chief Engineering Officer. The 3 top conduits shall extend 10' beyond the edges of roadway, 6 bottom conduits shall extend to ends of HMA slab.

* GRS = Galvanized Rigid Steel (conduit).

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

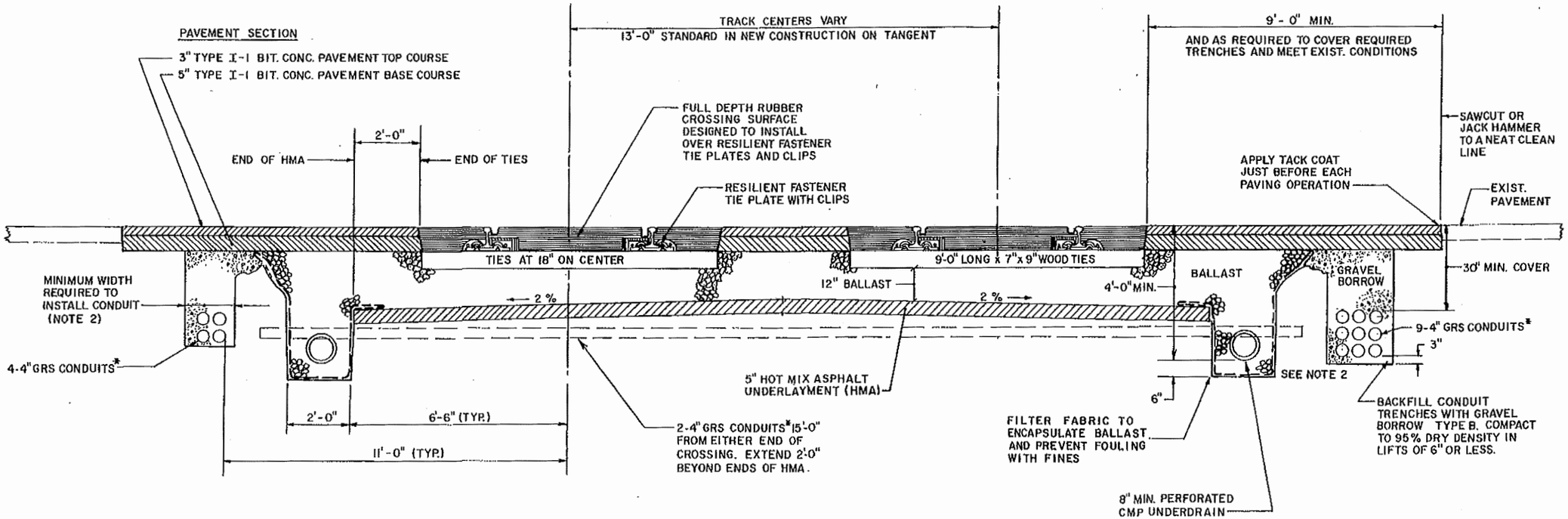
DWG. NO. 3100

Oct. 28, 1992 (1)
ISSUE DATE ISSUE NO.

GRADE CROSSING LAYOUT

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER


PAVEMENT SECTION
3" TYPE I-1 BIT. CONC. PAVEMENT TOP COURSE
5" TYPE I-1 BIT. CONC. PAVEMENT BASE COURSE
TRACK CENTERS VARY
13'-0" STANDARD IN NEW CONSTRUCTION ON TANGENT
9'-0" MIN.
AND AS REQUIRED TO COVER REQUIRED TRENCHES AND MEET EXIST. CONDITIONS
2'-0"
END OF HMA
END OF TIES
FULL DEPTH RUBBER CROSSING SURFACE DESIGNED TO INSTALL OVER RESILIENT FASTENER TIE PLATES AND CLIPS
RESILIENT FASTENER TIE PLATE WITH CLIPS
SAWCUT OR JACK HAMMER TO A NEAT CLEAN LINE
APPLY TACK COAT JUST BEFORE EACH PAVING OPERATION
EXIST. PAVEMENT
TIES AT 18" ON CENTER
9'-0" LONG x 7"x 9" WOOD TIES
MINIMUM WIDTH REQUIRED TO INSTALL CONDUIT (NOTE 2)
12" BALLAST
4'-0" MIN.
BALLAST
GRAVEL BORROW
30" MIN. COVER
2 %
2 %
9-4" GRS CONDUITS*
3"
4-4" GRS CONDUITS*
5" HOT MIX ASPHALT UNDERLAYMENT (HMA)
SEE NOTE 2
6"
2'-0"
6'-6" (TYP.)
11'-0" (TYP.)
2-4" GRS CONDUITS* 15'-0" FROM EITHER END OF CROSSING. EXTEND 2'-0" BEYOND ENDS OF HMA.
FILTER FABRIC TO ENCAPSULATE BALLAST AND PREVENT FOULING WITH FINES
BACKFILL CONDUIT TRENCHES WITH GRAVEL BORROW TYPE B. COMPACT TO 95% DRY DENSITY IN LIFTS OF 6" OR LESS.
8" MIN. PERFORATED CMP UNDERDRAIN

NOTES:

1. For plan of typical crossing, see drawing 3100.

2. To minimize settlement, keep excavation for underdrains and conduits to a minimum. Compact backfill in lifts not exceeding 6" to 95% of maximum dry density.

3. If soil or drainage conditions at the site are poor, the designer must obtain subsurface data and design subgrade and drainage modifications which may differ from what is shown on this standard design.

* GRS = Galvanized Rigid Steel (conduit).

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 3106

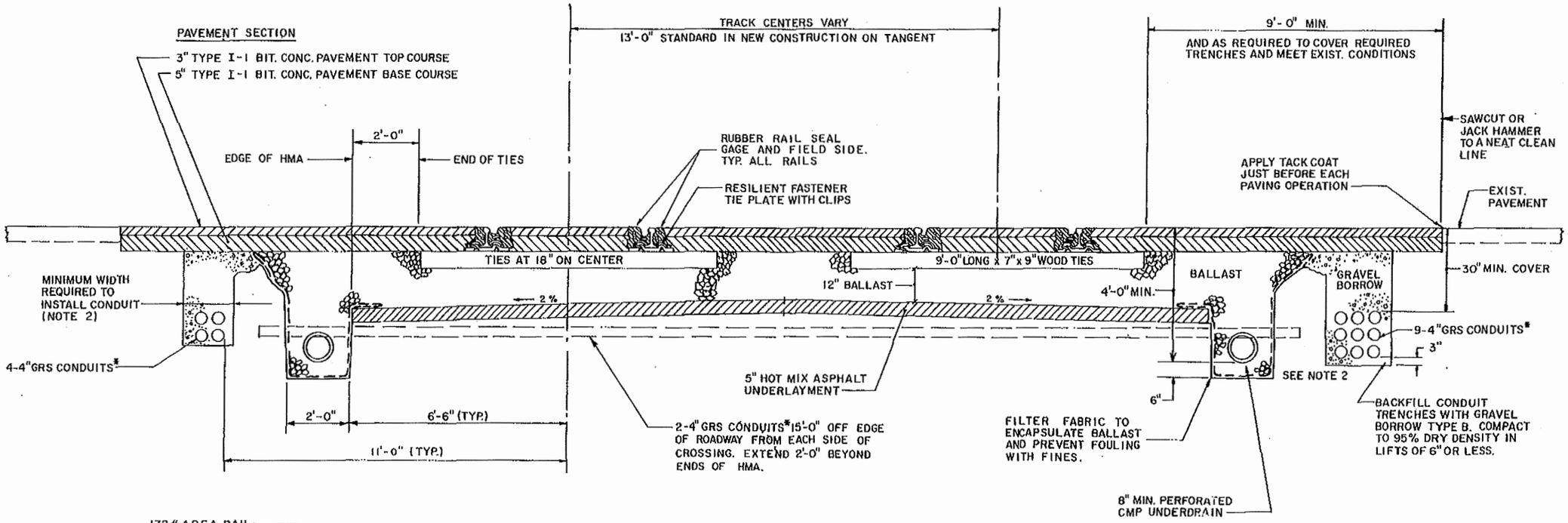
Oct. 28, 1992 ISSUE DATE

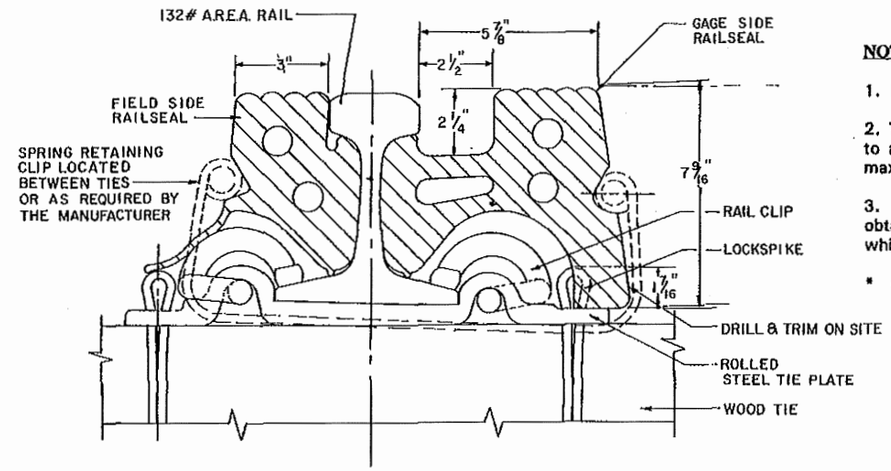
1 ISSUE NO.

TYPICAL SECTION FULL DEPTH RUBBER CROSSING

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER


PAVEMENT SECTION
3" TYPE I-1 BIT. CONC. PAVEMENT TOP COURSE
5" TYPE I-1 BIT. CONC. PAVEMENT BASE COURSE
TRACK CENTERS VARY
13'-0" STANDARD IN NEW CONSTRUCTION ON TANGENT
9'-0" MIN.
AND AS REQUIRED TO COVER REQUIRED TRENCHES AND MEET EXIST. CONDITIONS
2'-0"
EDGE OF HMA
END OF TIES
RUBBER RAIL SEAL GAGE AND FIELD SIDE, TYP. ALL RAILS
RESILIENT FASTENER TIE PLATE WITH CLIPS
SAWCUT OR JACK HAMMER TO A NEAT CLEAN LINE
APPLY TACK COAT JUST BEFORE EACH PAVING OPERATION
EXIST. PAVEMENT
TIES AT 18" ON CENTER
9'-0" LONG x 7" x 9" WOOD TIES
12" BALLAST
2%
2%
4'-0" MIN.
BALLAST
GRAVEL BORROW
30" MIN. COVER
MINIMUM WIDTH REQUIRED TO INSTALL CONDUIT (NOTE 2)
4-4"GRS CONDUITS*
9-4"GRS CONDUITS*
3"
5" HOT MIX ASPHALT UNDERLAYMENT
SEE NOTE 2
6"
2'-0"
6'-6" (TYP.)
11'-0" (TYP.)
2-4"GRS CONDUITS* 15'-0" OFF EDGE OF ROADWAY FROM EACH SIDE OF CROSSING. EXTEND 2'-0" BEYOND ENDS OF HMA.
FILTER FABRIC TO ENCAPSULATE BALLAST AND PREVENT FOULING WITH FINES.
BACKFILL CONDUIT TRENCHES WITH GRAVEL BORROW TYPE B. COMPACT TO 95% DRY DENSITY IN LIFTS OF 6" OR LESS.
8" MIN. PERFORATED CMP UNDERDRAIN



DETAIL AT RAIL SEAL

DIMENSIONS ARE FOR 132 LB RE RAIL

NOTES:

1. For plan of typical crossing, see drawing 3100.
2. To minimize settlement, keep excavation for underdrains and conduits to a minimum. Compact backfill in lifts not exceeding 6" to 95% of maximum dry density.
3. If soil or drainage conditions at the site are poor, the designer must obtain subsurface data and design subgrade and drainage modifications which may differ from what is shown on this standard design.

* GRS = Galvanized Rigid Steel (conduit).

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 3108

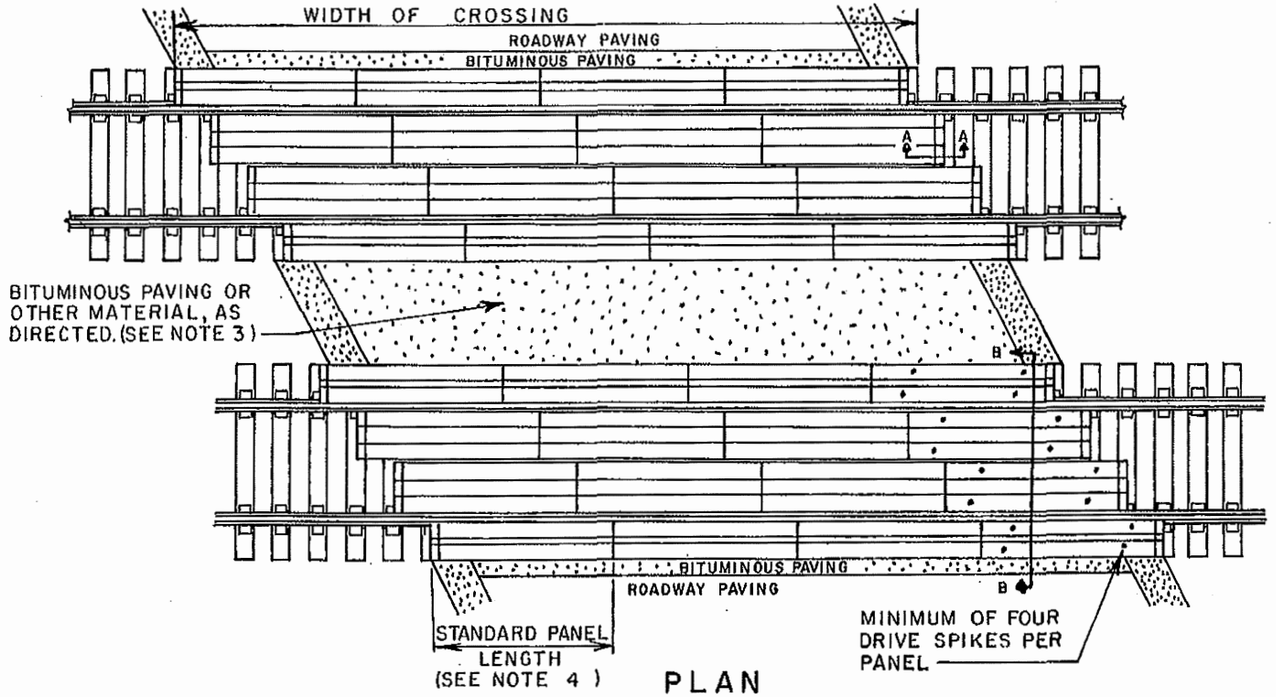
Oct. 28, 1992 (1)

ISSUE DATE ISSUE NO.

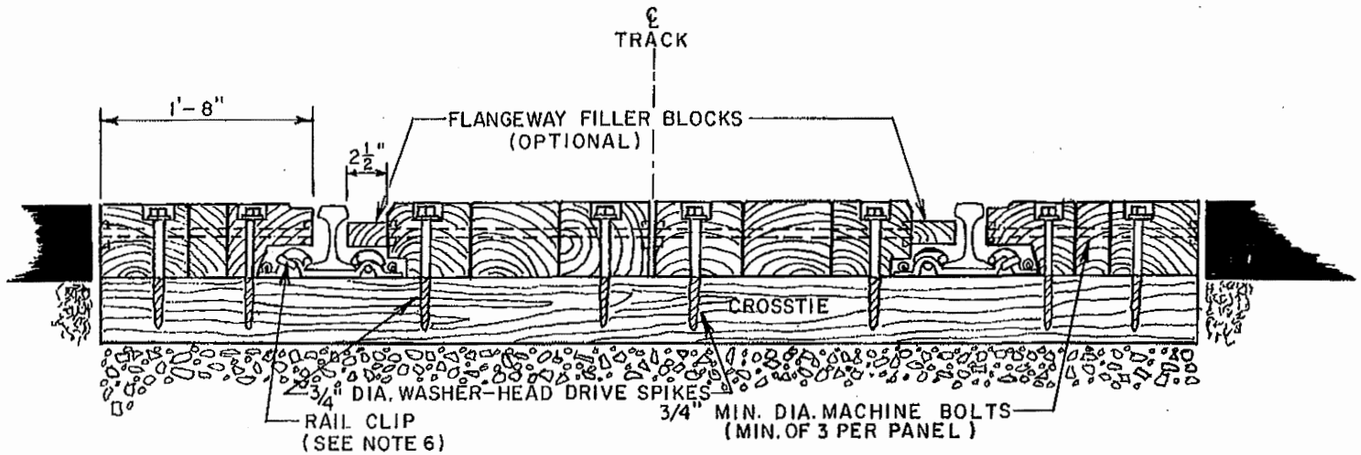
TYPICAL SECTION RUBBER RAIL SEAL CROSSING

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER

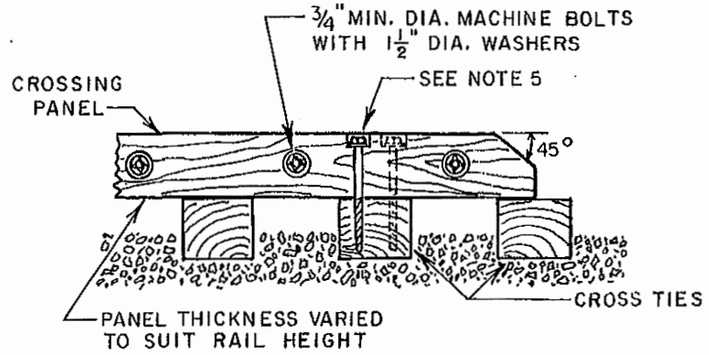


PLAN



TYPICAL TRACK SECTION

Section B-B



SIDE VIEW OF END PANEL

Section A-A

NOTES:

1. Timber grade crossing is to be used as a temporary crossing only, as directed or approved by the Chief Engineer.

2. When grade crossing is removed, spike holes shall be treated and plugged.

3. When the grade crossing contains multiple tracks, the paving material between the tracks shall be approved by the Chief Engineer.

4. Standard panel lengths are 8'-0" and 6'-4 3/4". Additional lengths are attained through multiples of these basic units.

5. Crossing panels to be bored in the field to fit existing tie spacing.

6. Timber panels to be manufactured to clear resilient track fastening system. Rail clip type and/or number to be provided to grade crossing supplier.

7. Timber panels shall be treated with creosote preservative as per A.R.E.A., Chapter 3.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 3120

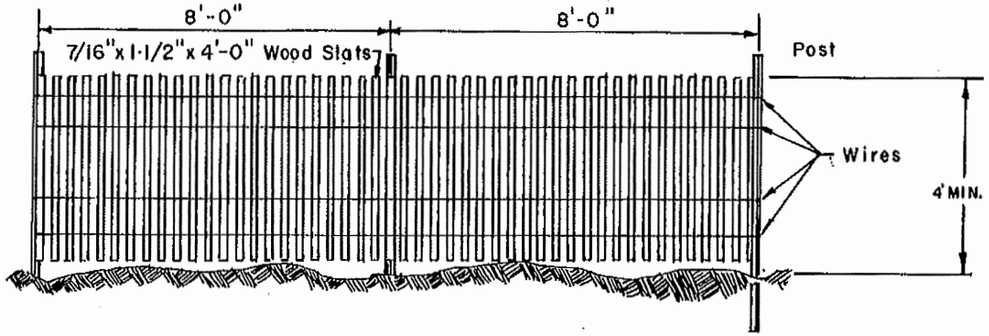
Oct. 28, 1992 (1)

ISSUE DATE ISSUE NO.

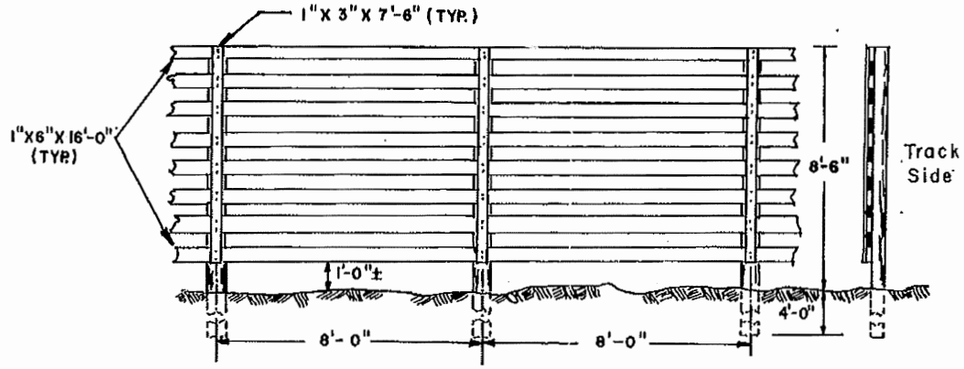
TEMPORARY TIMBER GRADE CROSSING

John D. Ray
ENGINEERING OFFICER

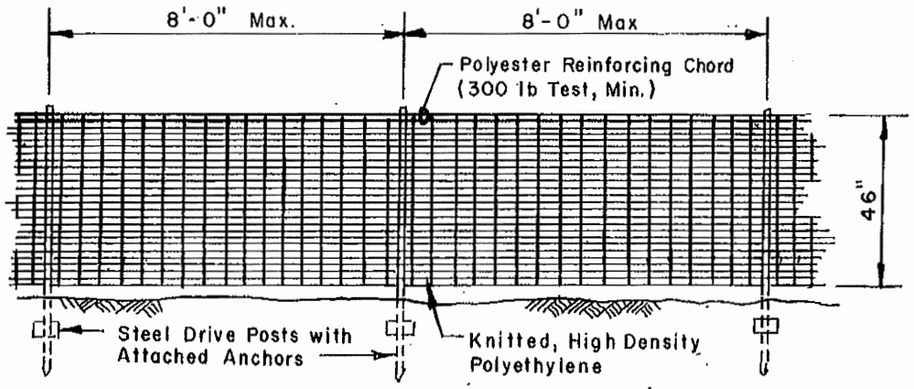
CHIEF ENGINEERING OFFICER



SLAT TYPE PORTABLE SNOW FENCE



WOOD OPEN BOARD SNOW FENCE



PORTABLE PLASTIC SNOW FENCE

NOTE

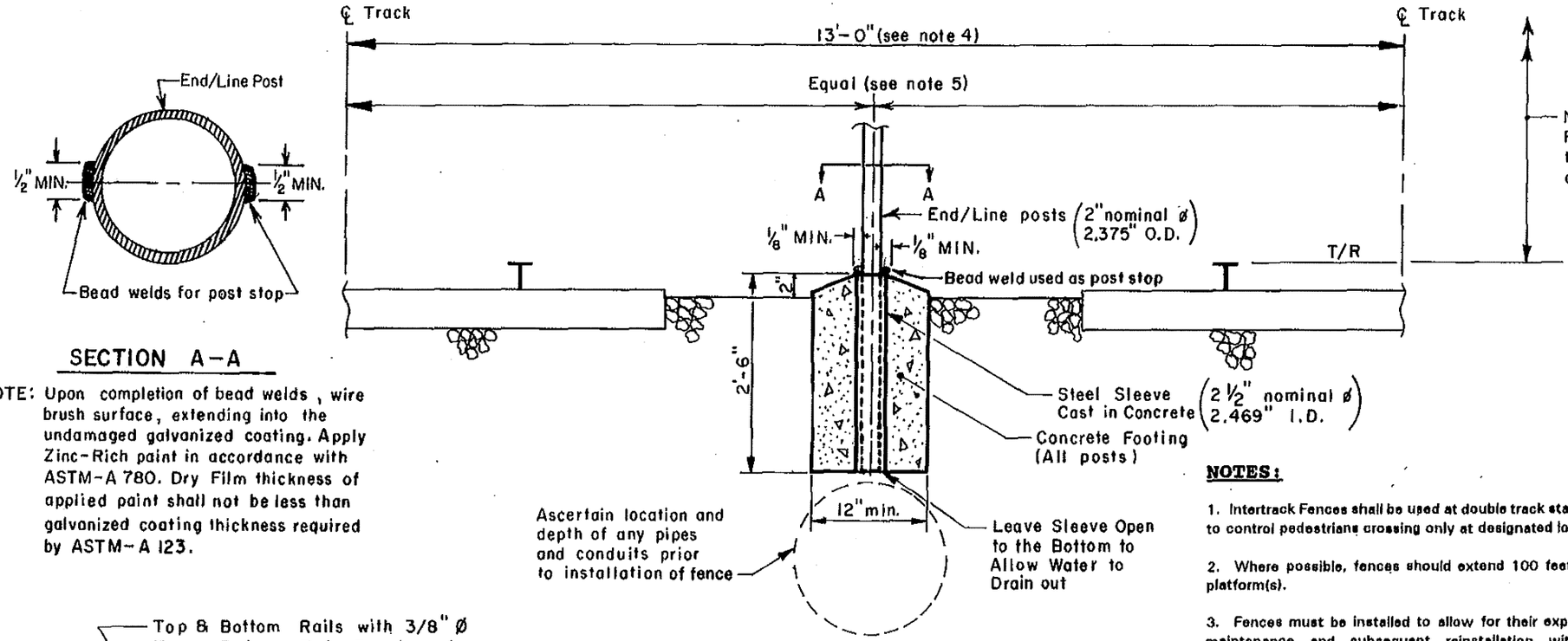
1. Posts and other materials used in the construction/erection of the snow fencing shall conform to the applicable standards of the AREA Manual, Part 6.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3200
		Oct. 28, 1992 (1)
		ISSUE DATE / ISSUE NO.

SNOW FENCES

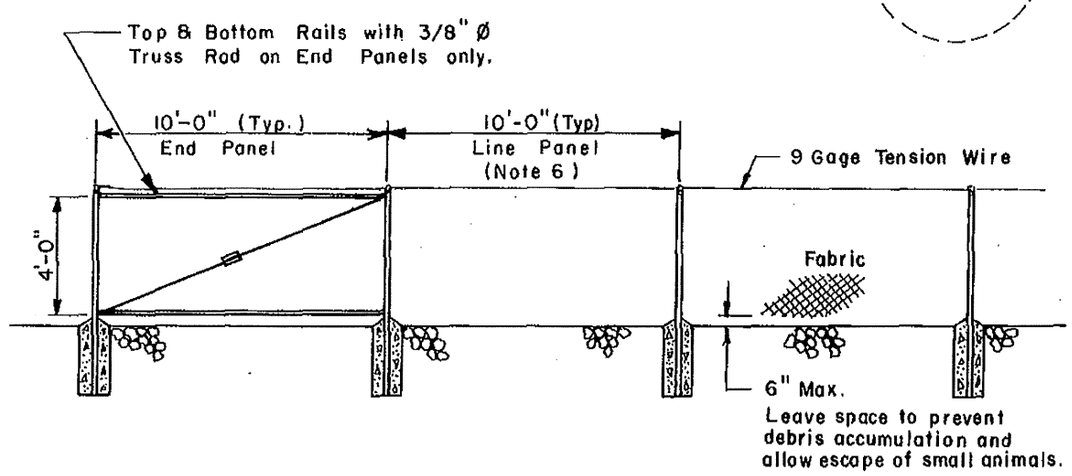
John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER


℄ Track
13'-0" (see note 4)
Equal (see note 5)
℄ Track
No part of Intertrack Fences shall be more than 4'-0" above top of rail.
End/Line Post
½" MIN.
½" MIN.
Bead welds for post stop
A
A
End/Line posts (2" nominal ø 2.375" O.D.)
⅛" MIN.
⅛" MIN.
T/R
Bead weld used as post stop
2"
2'-6"
Steel Sleeve Cast in Concrete (2½" nominal ø 2.469" I.D.)
Concrete Footing (All posts)
12" min.
Ascertain location and depth of any pipes and conduits prior to installation of fence
Leave Sleeve Open to the Bottom to Allow Water to Drain out

SECTION A–A

NOTE: Upon completion of bead welds, wire brush surface, extending into the undamaged galvanized coating. Apply Zinc-Rich paint in accordance with ASTM-A 780. Dry Film thickness of applied paint shall not be less than galvanized coating thickness required by ASTM-A 123.


Top & Bottom Rails with 3/8" ø Truss Rod on End Panels only.
10'-0" (Typ.) End Panel
10'-0" (Typ) Line Panel (Note 6)
9 Gage Tension Wire
4'-0"
Fabric
6" Max.
Leave space to prevent debris accumulation and allow escape of small animals.

NOTES:

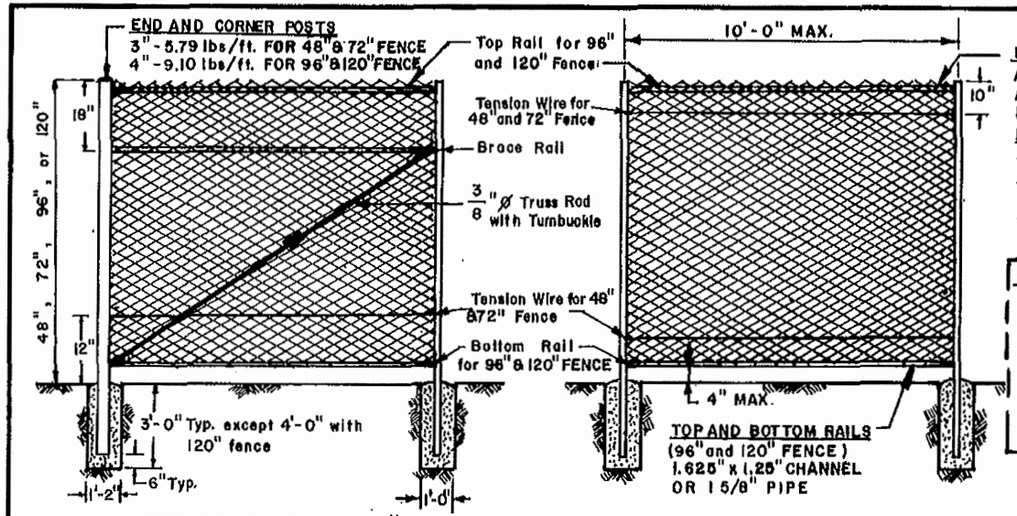
1. Intertrack Fences shall be used at double track stations with side platforms to control pedestrians crossing only at designated locations.
2. Where possible, fences should extend 100 feet beyond the end of the platform(s).
3. Fences must be installed to allow for their expedient removal for track maintenance and subsequent reinstallation with minimum hardware replacement.
4. 13'-0" is standard tangent track spacing. Fence shall not be installed when track centers are less than 12'-5" (Tangent).
5. Fence shall be installed equidistant from the two tracks but in no case shall the distance from centerline of track to any part of the fence be less than 6'-0" (Tangent Track).
6. To discourage vaulting over the fence, do not use top rails (except at end panels).
7. Details of Fence Fabric, Posts and Hardware as per Drawing 3206.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3204
		Oct. 28, 1992 (1)
		ISSUE DATE (ISSUE NO.)

INTERTRACK FENCE

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER


END AND CORNER POSTS
3" - 5.79 lbs/ft. FOR 48" & 72" FENCE
4" - 9.10 lbs/ft. FOR 96" & 120" FENCE
Top Rail for 96" and 120" Fence
Tension Wire for 48" and 72" Fence
Brace Rail
3/8" Ø Truss Rod with Turnbuckle
Tension Wire for 48" & 72" Fence
Bottom Rail for 96" & 120" FENCE
48", 72", 96", or 120"
18"
12"
3'-0" Typ. except 4'-0" with 120" fence
6" Typ.
1'-2"
1'-0"

END OR CORNER PANEL*

LINE PANEL

*BRACE PANEL TO INCLUDE AN ADDITIONAL PANEL BRACED AS SHOWN EXCEPT TRUSS ROD IN OPPOSITE DIRECTION.

FENCE FABRIC - SHALL BE TYPE I, GALV. STEEL ASTM A392, SIZE 6, COATING 2 OR TYPE II, ALUMINUM COATED STEEL, ASTM A491, SIZE 6. MESH, 2" MAX.

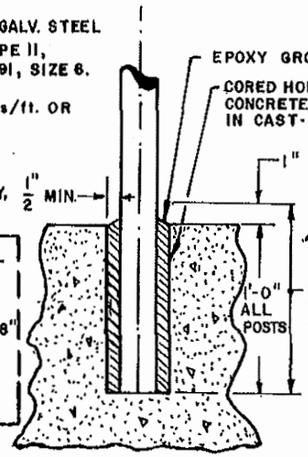
LINE POSTS - SHALL BE 2 3/8" - 3.12 lbs/ft. OR AS FOLLOWS:

- 72" FENCE, 48" FENCE — 2.25" x 1.70" 'H' POSTS OR 'C' POSTS.
- 96" FENCE, 120" FENCE — 2.25 x 1.70" 'H' POSTS ONLY.

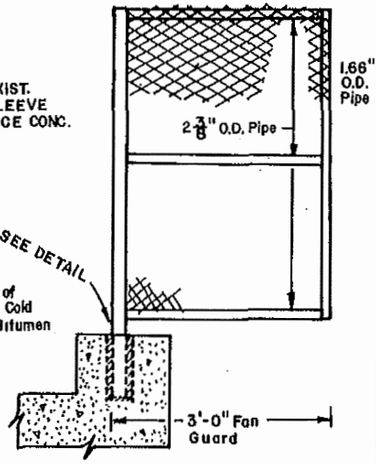
HIGH SECURITY FENCE ONLY

WHEN HIGH SECURITY FENCE IS INDICATED, MODIFY ITEMS SHOWN ON THIS SHEET AS FOLLOWS:

- FABRIC - ASTM A491, Size II, Mesh 3/8"
- LINE POSTS - 3" - 5.79 lbs/ft.
- END POSTS - 4" - 9.10 lbs/ft.
- USE TOP & BOTTOM RAILS FOR 120", 96" & 72" FENCE
- POST SPACING 6' - 0" MAX


EPOXY GROUT
CORED HOLE IN EXIST. CONCRETE OR SLEEVE IN CAST-IN-PLACE CONC.
1"
1/2" MIN.
SEE DETAIL
1'-0" ALL POSTS
Cast End of Post with Cold Applied Bitumen

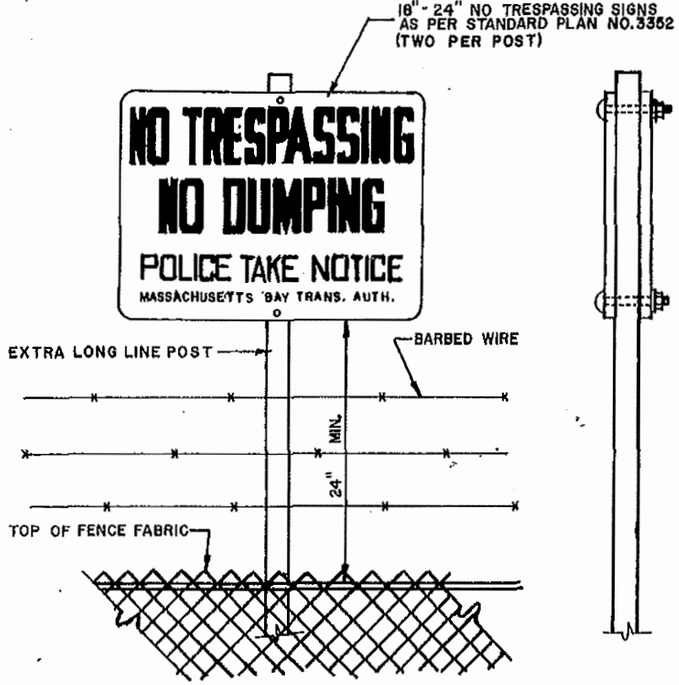
POST ANCHORED INTO CONCRETE



CANTILEVER FENCE DETAIL

BARBED WIRE TOP

USE ON FENCE AND GATES WHEN INDICATED. SHALL BE THREE STRANDS OF BARBED WIRE SUPPORTED ON EXTENSION ARMS LOCATED ON ALL POSTS.



SIGN MOUNTING DETAIL

SIGN INSTALLATION NOTES

- NO TRESPASSING SIGNS TO BE INSTALLED ON BOTH SIDES OF POSTS, FASTEN WITH 2 - 3/8" HIGH STRENGTH BOLTS, NUTS AND WASHERS. END OF BOLTS TO BE TACK WELDED TO PREVENT EASY REMOVAL OF SIGNS.
- SIGNS TO BE INSTALLED AT 200' MAX INTERVALS, ALL LOCATIONS WHERE FENCE ANGLE CHANGES MORE THAN 30° AND ON ALL GATES. (FOR GATE INSTALLATION, SEE PLAN NO. 3208.)

GENERAL NOTES

1. FOR HIGH SECURITY FENCE, SEE THE DASHED BOX TOP CENTER OF DRAWING.
2. FOR INTERMEDIATE BRACING PANEL, SEE "END OR CORNER PANEL".
3. ALL PIPE DIMENSIONS ARE OUTSIDE DIAMETER.
4. ALL POSTS AND HARDWARE SHALL BE HOT-DIPPED GALVANIZED STEEL.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 3206

Oct. 28, 1992 (2)
ISSUE DATE ISSUE NO.

CHAIN LINK FENCING

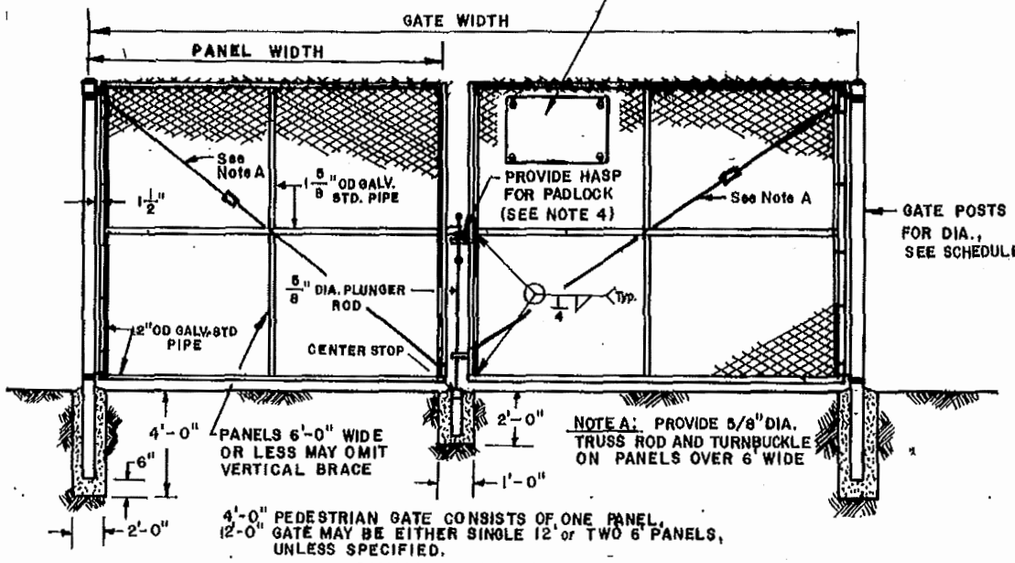
48", 72", 96", 120" and "HIGH SECURITY" TYPE

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER

:When barbed wire fence is indicated, the barbed wire shall also be placed on the gates

All gates shall have a NO TRESPASSING sign mounted on the outside of the fence fabric as shown below.



4'-0" PEDESTRIAN GATE CONSISTS OF ONE PANEL, 12'-0" GATE MAY BE EITHER SINGLE 12' or TWO 6' PANELS, UNLESS SPECIFIED.

SWING GATE

GATE POST SCHEDULE

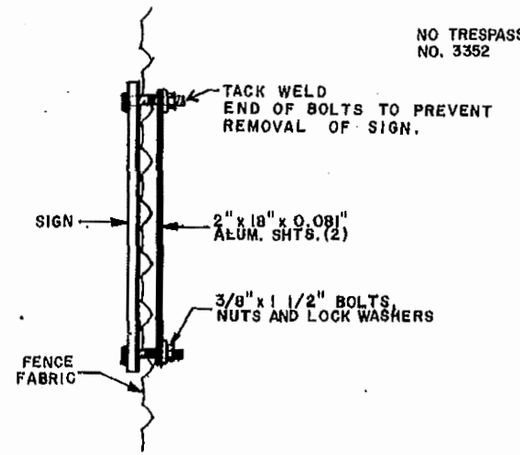
HEIGHT OF FENCE	GATE WIDTH	GATE POSTS O. D.	GATE POSTS WEIGHT
96" and 120"	4'-0"	4"	9.10 lbs./ft.
	12'-0"	6 5/8"	18.97 "
	20'-0"	6 5/8"	18.97 "
	24'-0"	6 5/8"	18.97 "
	30'-0"	8 5/8"	28.55 "
48" and 72"	4'-0"	3"	5.79 lbs./ft.
	12'-0"	4"	9.10 "
	20'-0"	6 5/8"	18.97 "
	24'-0"	6 5/8"	18.97 "
	30'-0"	6 5/8"	18.97 "

:Gate panels over 15'-0" must have additional bracing than that shown

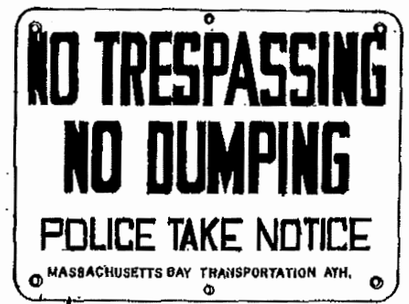
NOTES:

1. For fabric, see drawing NO. 3206
2. All hinges and hardware to be the the heaviest available and hot dip galvanized.
3. Sliding or cantilever type gates may also be used. Details must be submitted for approval.
4. Hasp shall have a hole diameter & overall size to accept the MBTA's standard R.O.W. lock.

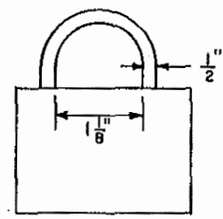
NO TRESPASSING sign as per STD PLAN NO. 3352


TACK WELD END OF BOLTS TO PREVENT REMOVAL OF SIGN.
SIGN
2" x 18" x 0.081" ALUM. SHTS.(2)
3/8" x 1 1/2" BOLTS, NUTS AND LOCK WASHERS
FENCE FABRIC

SIGN MOUNTING DETAIL



2" x 18" x 0.081 ALUM. SHEETS BEHIND SIGN AND FABRIC FOR MOUNTING.



STANDARD MBTA R.O.W. LOCK

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 3208

Oct. 28, 1992 (1)

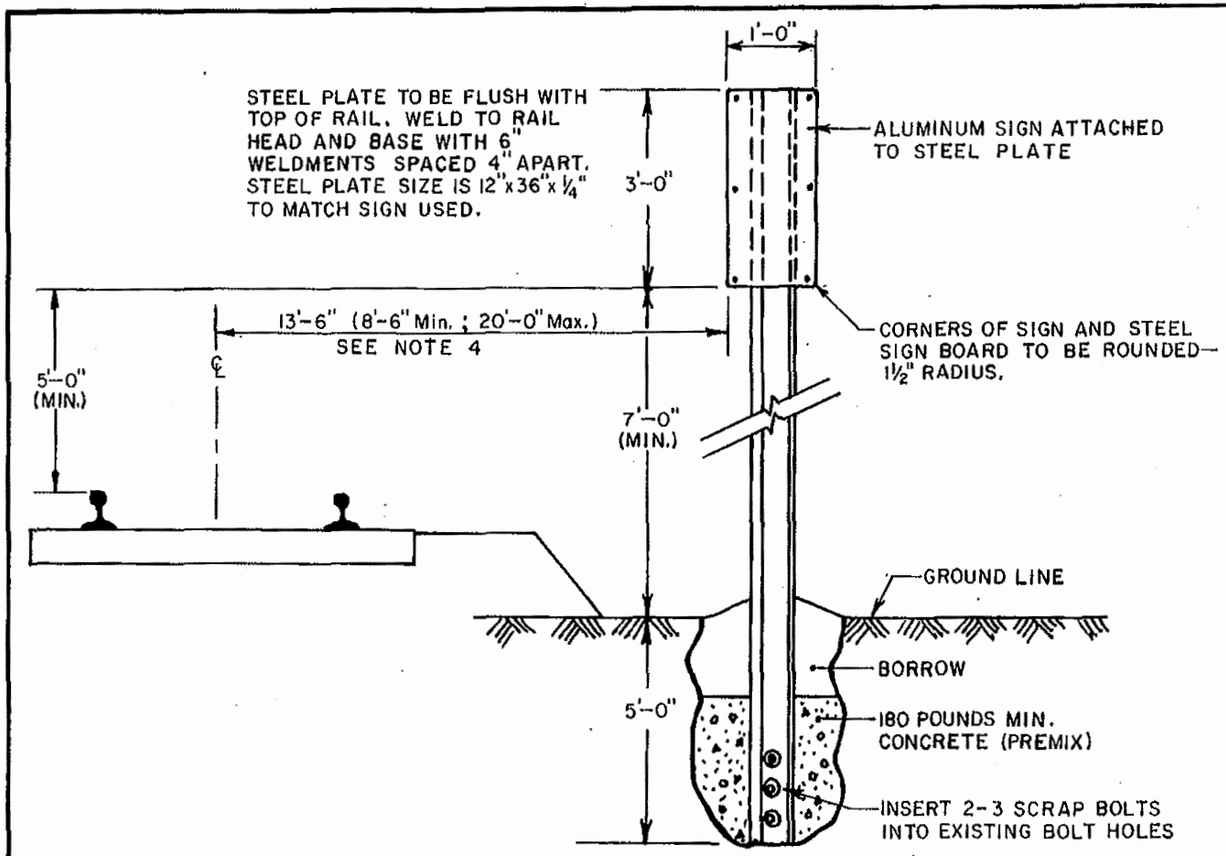
ISSUE DATE ISSUE NO.

CHAIN LINK FENCE GATES

John D. Ray

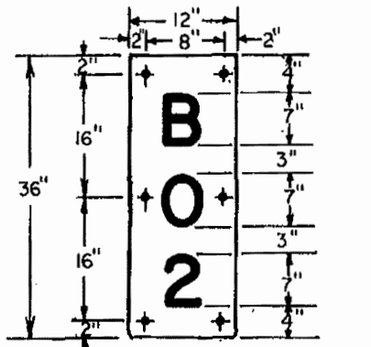
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER


1'-0"
STEEL PLATE TO BE FLUSH WITH TOP OF RAIL. WELD TO RAIL HEAD AND BASE WITH 6" WELDMENTS SPACED 4" APART. STEEL PLATE SIZE IS 12"x36"x 1/4" TO MATCH SIGN USED.
3'-0"
ALUMINUM SIGN ATTACHED TO STEEL PLATE
13'-6" (8'-6" Min. ; 20'-0" Max.)
SEE NOTE 4
CORNERS OF SIGN AND STEEL SIGN BOARD TO BE ROUNDED— 1½" RADIUS.
5'-0" (MIN.)
7'-0" (MIN.)
GROUND LINE
BORROW
5'-0"
180 POUNDS MIN. CONCRETE (PREMIX)
INSERT 2-3 SCRAP BOLTS INTO EXISTING BOLT HOLES

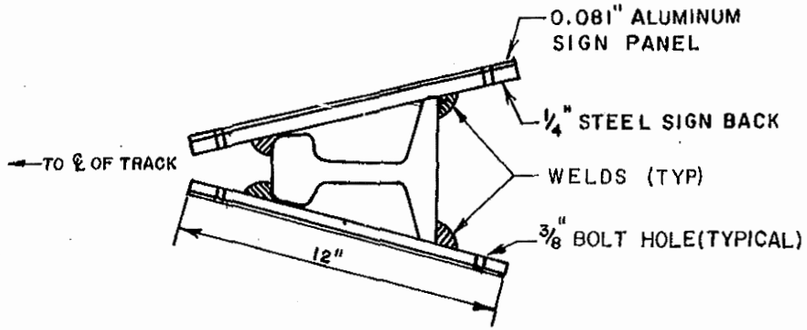
SIGN POST — FRONT VIEW

Not to Scale



SIGN — FRONT VIEW

Not to Scale



SIGN — TOP VIEW

Not to Scale

NOTES:

1. Posts are to be made from scrap rail, not less than 112 LB section, free from bends, kinks or visible damage. Length of posts shall be as required to place sign boards at the indicated dimensions and will be 15 feet long, minimum.

2. Two sign backs per post shall be 12"x36", 1/4" thick steel. Remove edging burrs, sharp edges, and corners.

3. Sign boards and rail posts shall be carefully cleaned with a solvent to remove all dirt and grease. A coat of primer suitable for use on metal shall be applied to all surfaces, and two finish coats of durable white enamel suitable for outdoor use over metal shall be applied with 24 hours minimum drying time between coats.

4. 13'-6" dimension, sign to centerline of track, may be altered where conditions such as steep embankment slope prohibit placement. In no case shall sign be closer than 8'-6" to centerline of track, nor further than 20'-0".

5. Sign to be 12"x36"x.081" Aluminum Alloy 6061-T6 with 6 - 3/8" holes as shown.

6. Mount sign to 1/4" steel plate with 4 - 5/16" bolts 1" long, 4 flat washers, 4 lock washers and 4 nuts all cadmium plated. Steel plate shall be sized and drilled to match sign.

7. Background to be white reflectorized, FSL-S-300 A type, class 1 or 2, reflectivity 1.

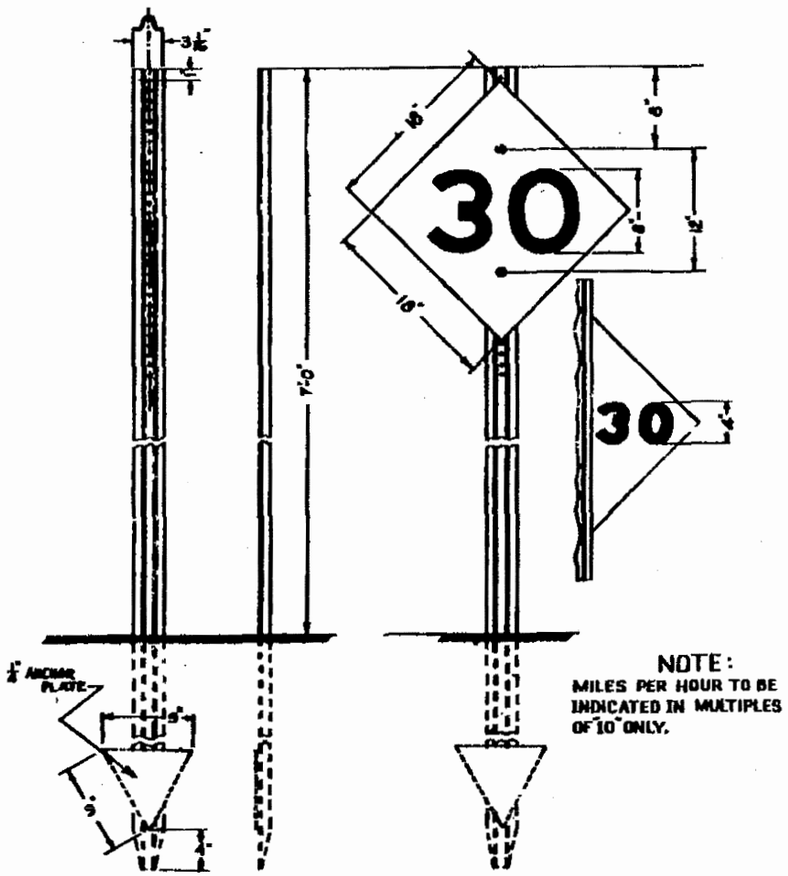
8. Mileage numerals and letters shall be 7" high Helvetica Medium style, black gloss silk screen letters MHD materials spec. M7.04.12.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3302
		Oct. 28, 1992 (ISSUE DATE) (1) (ISSUE NO.)

MILE POSTS

John B. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER

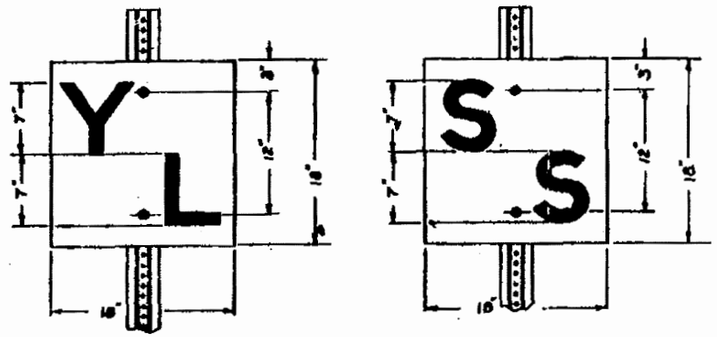


SIGN POST

U-SECTION POST HEAVY TYPE OF ¼" ROLLED OPEN HEARTH STEEL. 30-⅜" HOLES ON 1" CENTERS. LENGTHS OF POSTS TO BE DETERMINED IN FIELD. BAKED ENAMEL FINISH (BLACK)

SPEED RESTRICTION SIGN

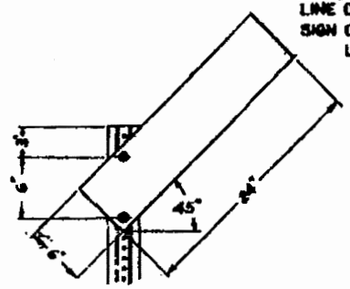
USE A 18"x 18"x.081" ALUMINUM ALLOY 6061-T6 No. 2271 YELLOW SCOTCHLITE, 8" SERIES "D" NUMBERS 605 BLACK SCOTCHCAL. PUNCH 2-⅜" HOLES AS SHOWN FOR 2-⅜" BOLTS 2" LONG AND 4 WASHERS CADMIUM PLATED.
LOCATION - POST 11' FROM CENTER LINE OF TRACK WHEN POSSIBLE.
LOCATION - NOT LESS THAN ONE-HALF MILE IN ADVANCE OF THE POINT AT WHICH THE SPEED RESTRICTION BEGINS.



YARD LIMIT SIGN

SPRING SWITCH SIGN

USE 18"x18"x.081" ALUMINUM ALLOY 6061-T6 No. 2271 YELLOW SCOTCHLITE AND 605 BLACK SCOTCHCAL 7" SERIES "D" LETTERS PUNCH 2-⅜" HOLES AS SHOWN FOR 2-⅜" BOLTS 2¼" LONG AND 4 WASHERS CADMIUM PLATED 2 SIGNS REQUIRED ONE ON EACH SIDE OF POST. LOCATION 11'-3" FROM CENTER LINE OF TRACK. SPRING SWITCH SIGN OPPOSITE SW. POINT LEFT SIDE.



SNOW FLANGER SIGN

USE 8"x24"x.081" ALUMINUM ALLOY 6061-T6, 2271 YELLOW SCOTCHLITE PUNCH 2-⅜" HOLES AS SHOWN FOR 2-⅜" BOLTS 2" LONG AND 4 WASHERS CADMIUM PLATED.
LOCATION 10'-0" FROM CENTER LINE OF TRACK, 50'-0" FROM OBSTRUCTION ON ENGINEERS SIDE WITH ANGLE TO THE RIGHT.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 3304

Nov. 17, 1986 (1)
ISSUE DATE ISSUE NO.

SPEED RESTRICTIONS, YARD LIMIT & FLANGER SIGNS

David Brown
ENGINEERING OFFICER

W A MacDonald
CHIEF ENGINEERING OFFICER

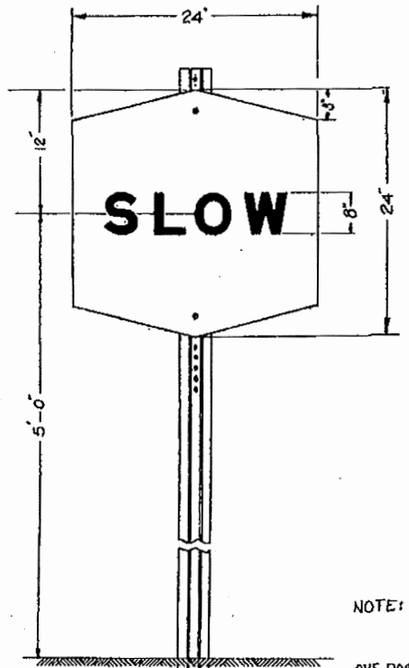
REQUIREMENTS

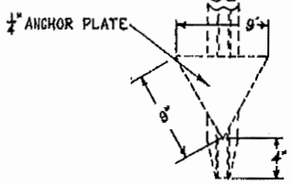
FOR ONE SINGLE-TRACK LOCATION

- (2) REDUCE-SPEED BOARDS
- (2) SLOW BOARDS - "
- (2) RESUME-SPEED BOARDS - "
- (2) PLATES 10"x18" (10-20) - "
- (2) PLATES 10"x18" (30-40)
- (6) U-SECTION POSTS, 9'-6" LONG
- (26) 2" BOLTS

FOR ONE DOUBLE-TRACK LOCATION

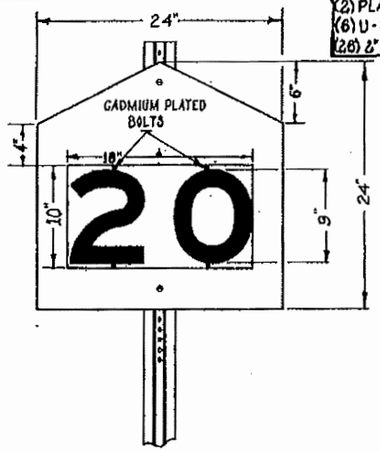
- (2) REDUCE-SPEED BOARDS
- (2) SLOW BOARDS - "
- (2) RESUME-SPEED BOARDS - "
- (2) PLATES 10"x18" (10-20) - "
- (2) PLATES 10"x18" (30-40) - "
- (6) U-SECTION POSTS 9'-6" LONG
- (26) 2" BOLTS
- (2) REDUCE-SPEED BOARDS
- (2) SLOW BOARDS - "
- (2) RESUME-SPEED BOARDS - "
- (2) PLATES 7"x12" (10-20) - "
- (2) PLATES 7"x12" (30-40) - "
- (4) U-SECTION POSTS 4'-11" LONG
- (20) 2" - BOLTS





SLOW BOARD

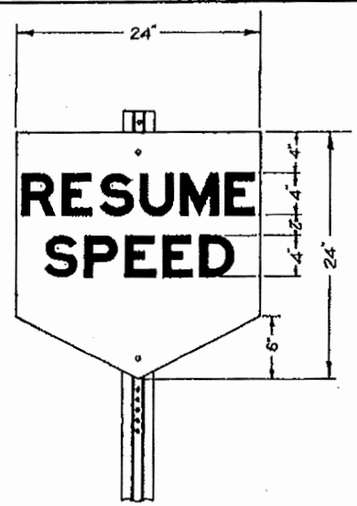
USE A 24"x 24"x.081" ALUMINUM ALLOY 6061-T6. No. 2271 YELLOW SCOTCHLITE, 8" SERIES "D" LETTERS 605 BLACK SCOTCHCAL. ON REVERSE SIDE. USE 455 BLACK SCOTCHCAL.



REDUCE SPEED BOARD

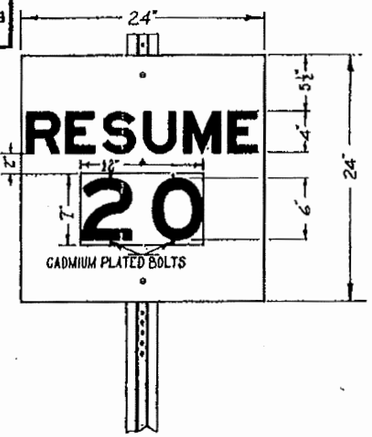
USE A 24"x 24"x.081" ALUMINUM ALLOY 6061-T6, No.2271 YELLOW SCOTCHLITE ON REVERSE SIDE USE 455 BLACK SCOTCHCAL

TWO ATTACHABLE (10"x 18" ALUMINUM PLATES) WITH 9" SERIES "D" NUMBERS (605 BLACK SCOTCHCAL) AND NO. 2271 YELLOW SCOTCHLITE ON EACH SIDE AS FOLLOWS: (10 - 20), (30-40) (ATTACH PLATES WITH CADMIUM PLATED BOLTS AND WASHERS)



RESUME SPEED BOARD

USE A 24"x 24"x.081" ALUMINUM ALLOY 6061-T6, No. 2277 GREEN SCOTCHLITE, 4" SERIES "D" LETTERS 605 BLACK SCOTCHCAL., ON REVERSE SIDE USE 455 BLACK SCOTCHCAL.



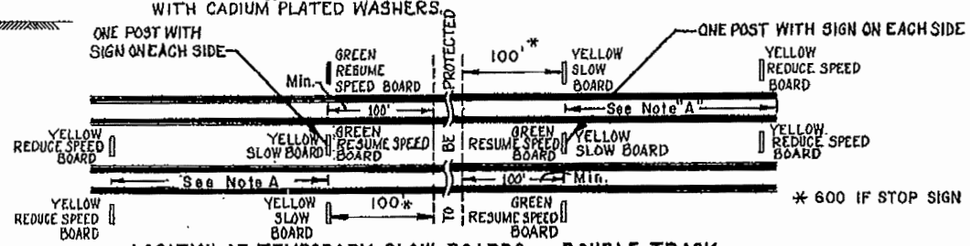
INTERMEDIATE RESUME SPEED BOARD

USE A 24"x 24"x.081" ALUMINUM ALLOY 6061-T6, No. 2271 YELLOW SCOTCHLITE, 4" SERIES "D" LETTERS 605 BLACK SCOTCHCAL ON REVERSE SIDE USE 455 BLACK SCOTCHCAL.

TWO ATTACHABLE (7"x12" ALUMINUM PLATES) WITH 6" SERIES "D" NUMBERS (605 BLACK SCOTCHCAL) AND NO 2271 YELLOW SCOTCHLITE ON EACH SIDE AS FOLLOWS: (10 - 20), (30 - 40) (ATTACH PLATES WITH CADMIUM PLATED BOLTS AND WASHERS)

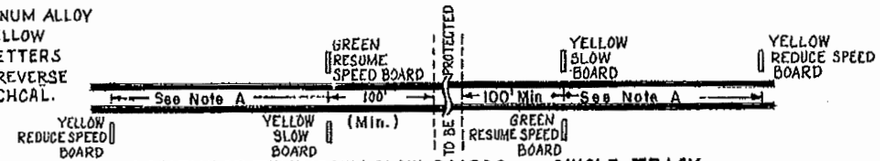
(TO BE USED WHEN A SECONDARY RESTRICTION IS SET UP WITHIN THE LIMITS OF RESTRICTION)
LOCATION: 100 FT. BEYOND THE POINT TO BE PROTECTED AND UPON THE RIGHT OF AND ADJOINING TRACK TO WHICH IT REFERS.

NOTE: PUNCH 3/8" HOLES AS SHOWN ON EACH PLATE FOR 5/16" BOLTS 2" LONG WITH CADIUM PLATED WASHERS.



* 600 IF STOP SIGN

LOCATION OF TEMPORARY SLOW BOARDS — DOUBLE TRACK



LOCATION OF TEMPORARY SLOW BOARDS — SINGLE TRACK

NOTE A THE DISTANCES BETWEEN SIGNS IS VARIABLE AND IS A FUNCTION OF TRACK SPEED. SEE DRAWING 3307.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 3306

Oct. 28, 1992 (2)
ISSUE DATE ISSUE NO.

TEMPORARY SLOW BOARDS

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER

Speed – MPH Reduced		Distance Between Signs – FEET (Level or Ascending Grade) *	
From	To	Passenger	Freight
80	70	1300	
"	60	2300	
"	50	3200	
"	40	4000	
"	30	4500	
"	20	5000	
"	10	5200	
"	STOP	5700	
70	60	1100	
"	50	2000	
"	40	2700	
"	30	3300	
"	20	3700	
"	10	4000	
"	STOP	4500	
60	50	1000	
"	40	1700	
"	30	2300	
"	20	2700	
"	10	3000	
"	STOP	3500	
50	40	800	2700
"	30	1400	4700
"	20	1800	6200
"	10	2200	7100
"	STOP	2700	7600

Speed – MPH Reduced		Distance Between Signs – FEET (Level or Ascending Grade) *	
From	To	Passenger	Freight
40	30	600	2100
"	20	1100	3500
"	10	1500	4500
"	STOP	2000	5000
30	20	500	1500
"	10	900	2400
"	STOP	1400	2900
20	10	400	900
"	STOP	900	1400
10	STOP	500	700

* For descending grades in percent, increase distances above as follows.

Level to 0.10% - NONE
0.11% to 0.36% - 10%
0.37% to 0.66% - 20%
0.67% to 0.92% - 30%
0.93% to 1.14% - 40%
1.15% to 1.33% - 50%
1.34% to 1.50% - 60%
1.51% to 1.64% - 70%
1.65% to 1.78% - 80%
1.79% to 1.90% - 90%
1.91% to 2.00% - 100%
2.01% to 2.10% - 110%

NOTE:
See Drawing NO. 3306 for sign detail and placement.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

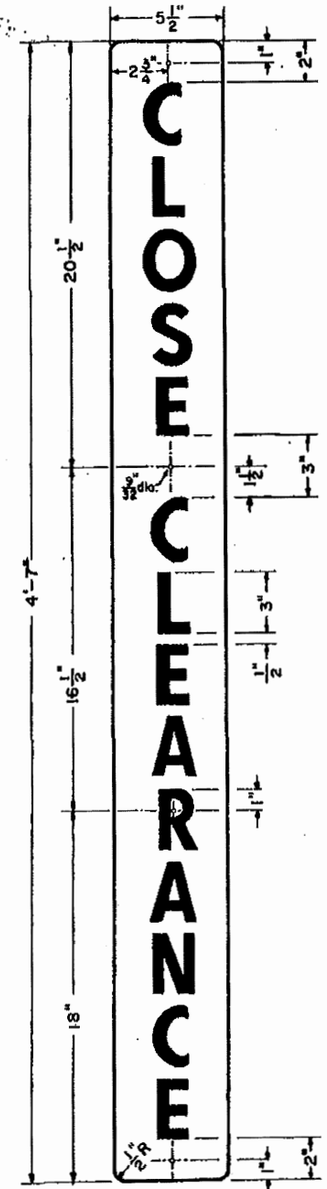
DWG. NO. 3307

Oct. 28, 1992 (1)
ISSUE DATE ISSUE NO.

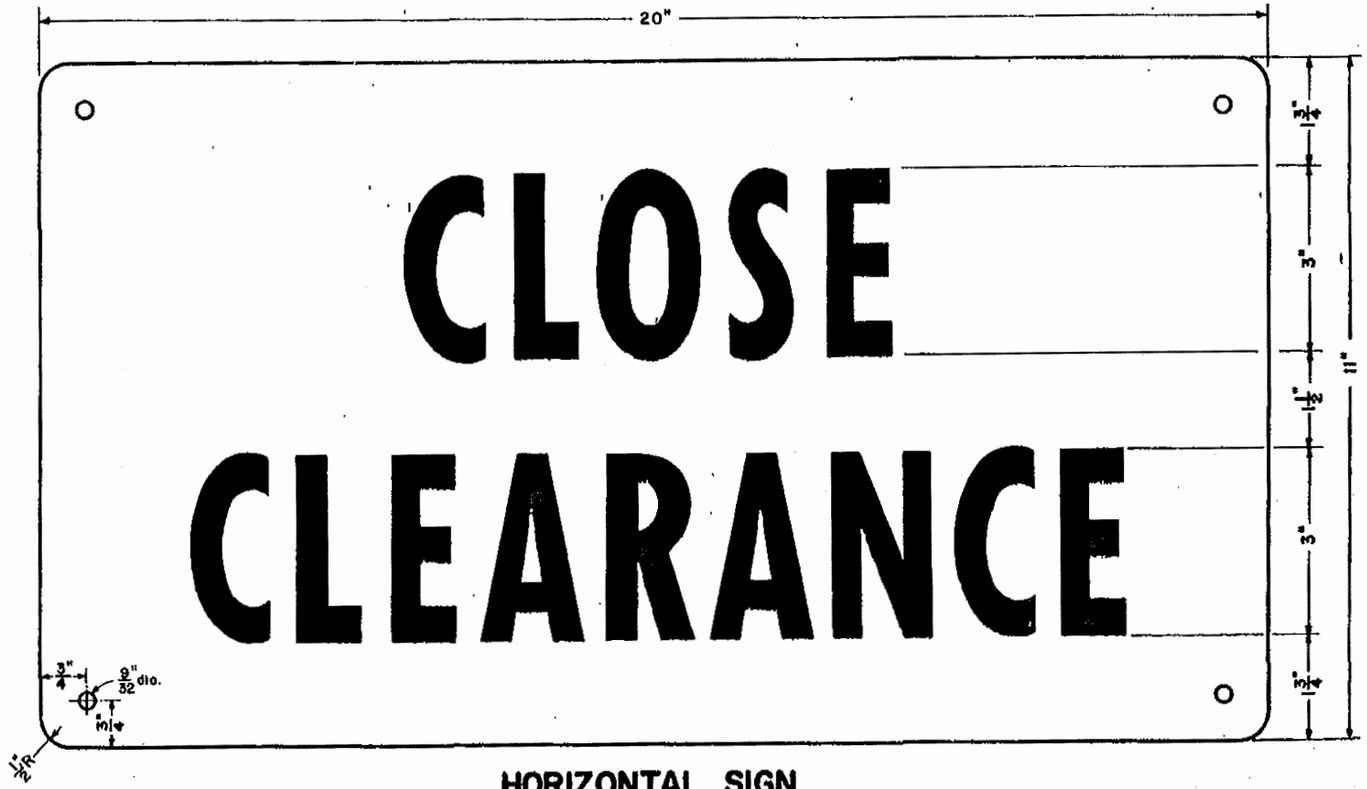
TABLE OF SLOW BOARD PLACEMENT DISTANCES

John D. Ray
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



VERTICAL SIGN



HORIZONTAL SIGN

NOTES

1 – The sign plate shall be 6061-T6 aluminum sheeting .081" thick., with one side covered with No.2870 Silver Scotchlite and No.605 Black Scotchcal letters.

2 – "Close Clearance" signs shall be displayed where objects do not provide for full clearance as per Plans 1012 to 1018. The signs shall be attached to the side of a building or other flat surface and shall be held away from the surface about 1" with furring strips or spools, to allow for ventilation. No.14 aluminum round head wood screws or $\frac{1}{4}$" dia. aluminum bolts shall be used to attach the signs. Aluminum washers shall be used under heads of bolts or screws.

3 – Lettering to be MBTA Standard Helvetica for the vertical sign and in the condensed form for the horizontal sign.

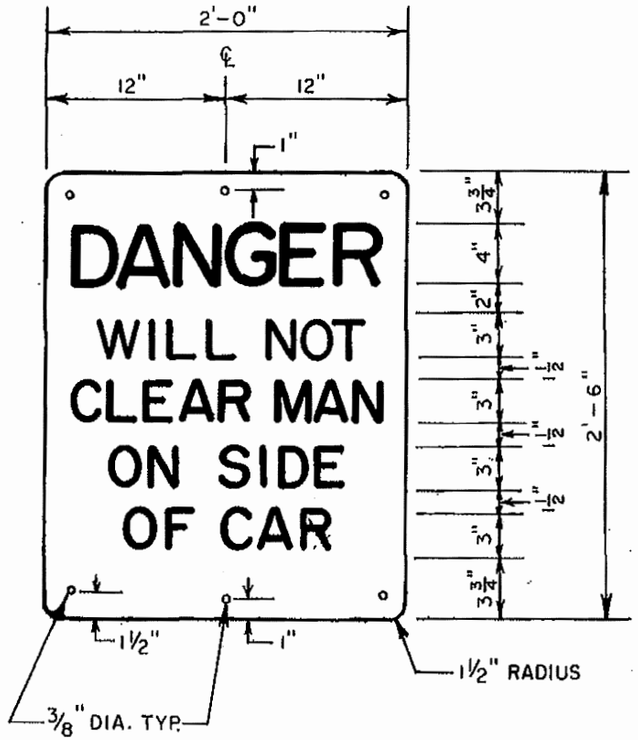
4 – Signs to be furnished with attachment hardware.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3312
		Nov. 17, 1986 (ISSUE DATE)
		(1) (ISSUE NO.)

CLOSE CLEARANCE SIGNS

Daniel Brem — ENGINEERING OFFICER

W. A. Mumbull — CHIEF ENGINEERING OFFICER



Helvetica Medium black letters on yellow reflective field, center.

CLEARANCE WARNING SIGN

- Signs to be 0.081" thick aluminum alloy sheet, ASTM B 209.
- Black gloss silk letters MHD materials spec. M7.04.12.

NOTES:

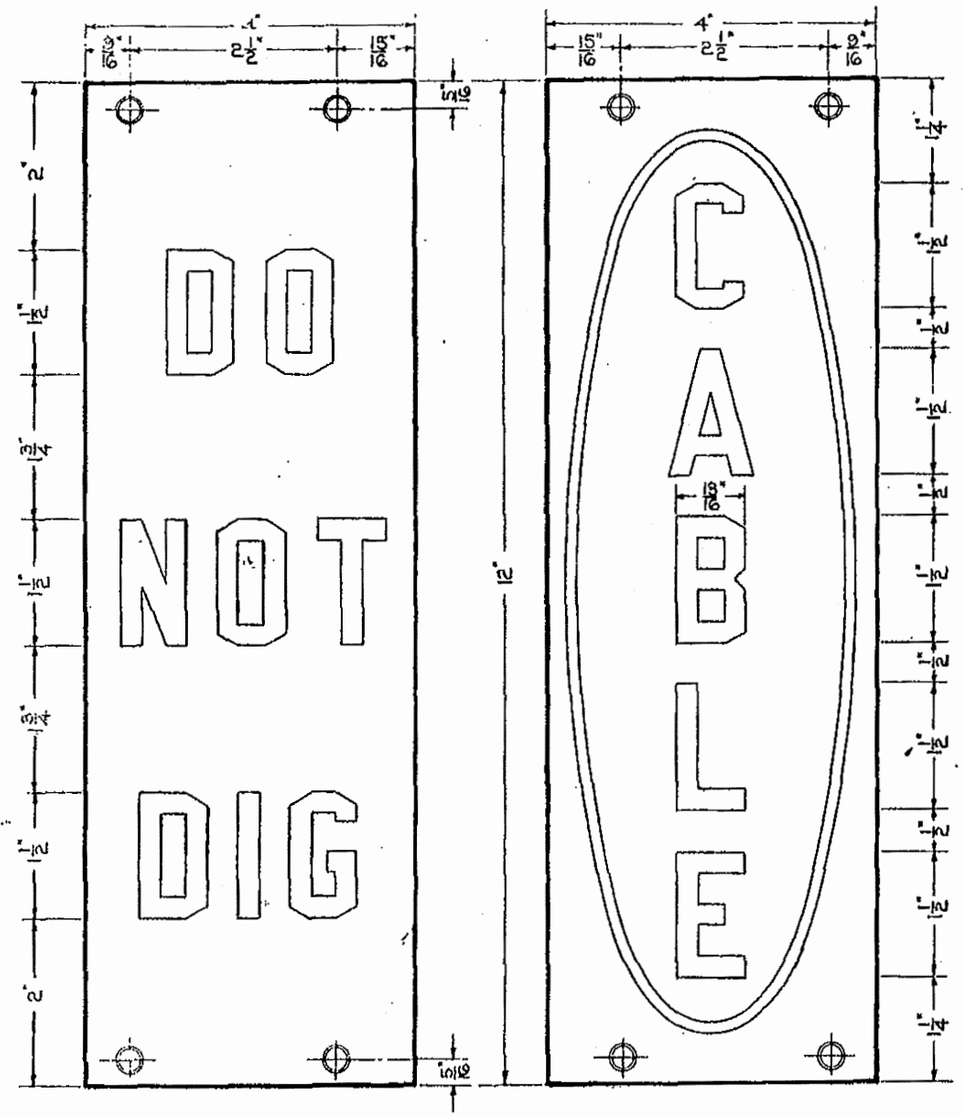
1. Free standing signs shall be mounted on steel "U" shaped posts. Signs attached to structures shall be attached using threaded inserts.
2. All signs shall have six holes drilled to allow mounting on either posts or structures.

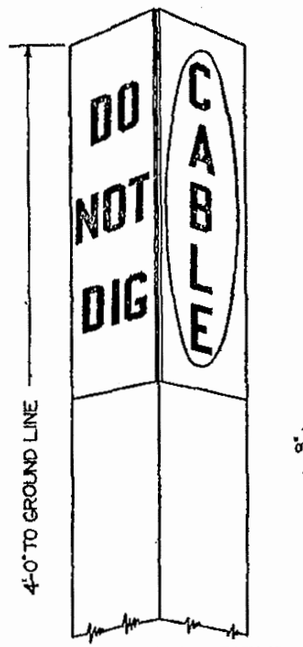
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3314
		Oct. 28, 1992 (1)
		ISSUE DATE / ISSUE NO.

CLEARANCE WARNING SIGN

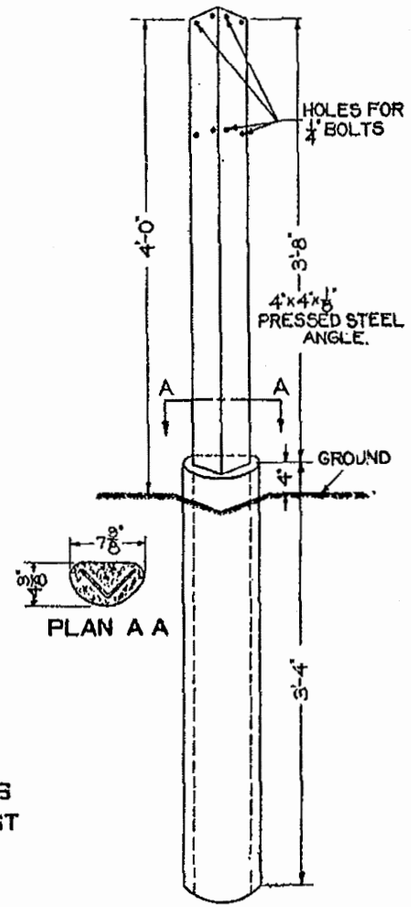
John D. Ray — ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



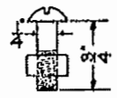


LOCATION OF SIGNS
ON ANGLE IRON POST



PLAN A A

SIGN POST DETAIL



BOLT

NOTES

SIGNS TO BE MADE OF #18 GAGE STEEL AND HAVE PORCELAIN ENAMEL FINISH.
COLORS- WORDS "DO NOT DIG" BLACK. BALANCE OF SIGN WHITE. WORD CABLE BLACK ON YELLOW OVAL. LINE AROUND OVAL BLACK. BALANCE OF SIGN WHITE.
POST- 4"x4"x⅛" PRESSED STEEL ANGLE IRON, GALVANIZED & SET IN CONCRETE FOOTING.
BOLTS- SIGN BOLTS ¼" x ¾" AS SHOWN, TO BE BRONZE OR BRASS.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 3344

Nov. 17, 1986
ISSUE DATE

1
ISSUE NO.

DO NOT DIG- BURIED CABLES

Daniel Breen
ENGINEERING OFFICER

W A MacDonald
CHIEF ENGINEERING OFFICER

NO TRESPASSING SIGN

- Signs to be 0.081" thick aluminun alloy sheet - ASTM B 209
- White reflectorized background. FS L-S-300 A TYPE, Class 1 or 2, reflectivity 1
- Black gloss silk screen letters MHD materials spec. M7.04.12

NOTES:

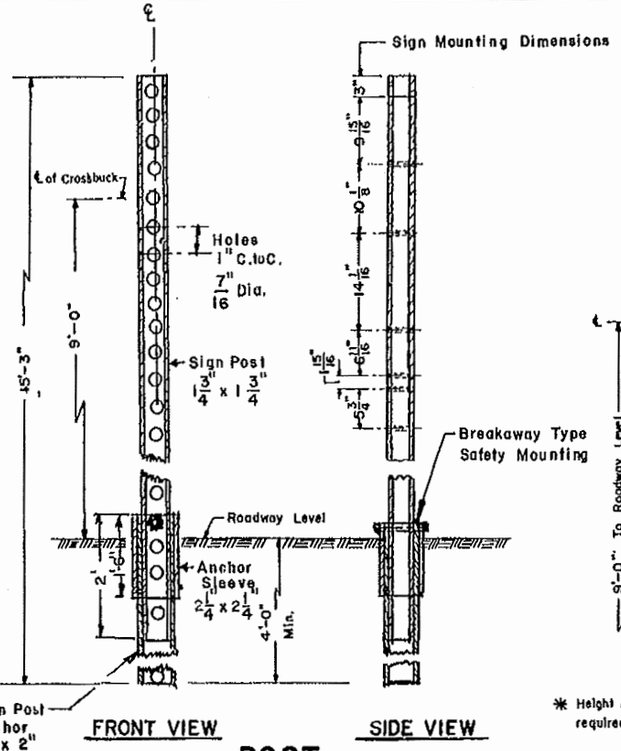
1. Free standing signs not attached to fences to be mounted on steel "U" shaped posts.
2. Place signs on both sides of right of way facing back towards highway grade crossing, at end of station platforms and at any location where trespassing is a problem.
3. Place on ROW fences at intervals not exceeding 200' (see Dwg. No.3206) and on all gates (see Dwg. No.3208).
4. All signs shall have six holes drilled to allow mounting on either posts or fence fabric.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3352
		Oct. 28, 1992 (ISSUE DATE) (1) (ISSUE NO.)

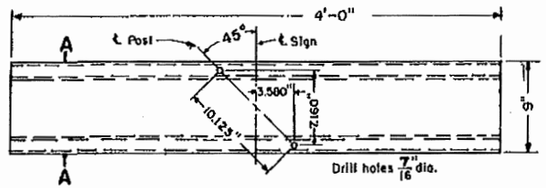
NO TRESPASSING SIGN

John D. Ray
ENGINEERING OFFICER

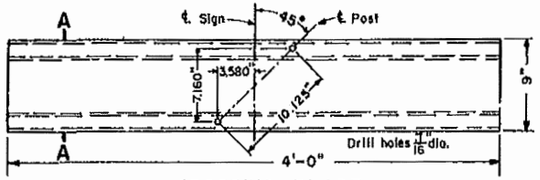
CHIEF ENGINEERING OFFICER



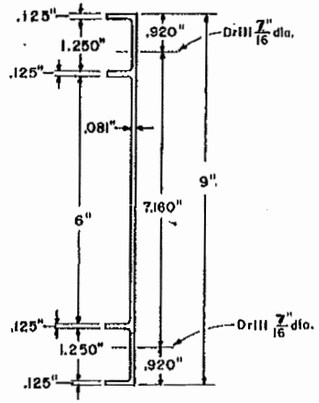
POST



RAILROAD BLADE

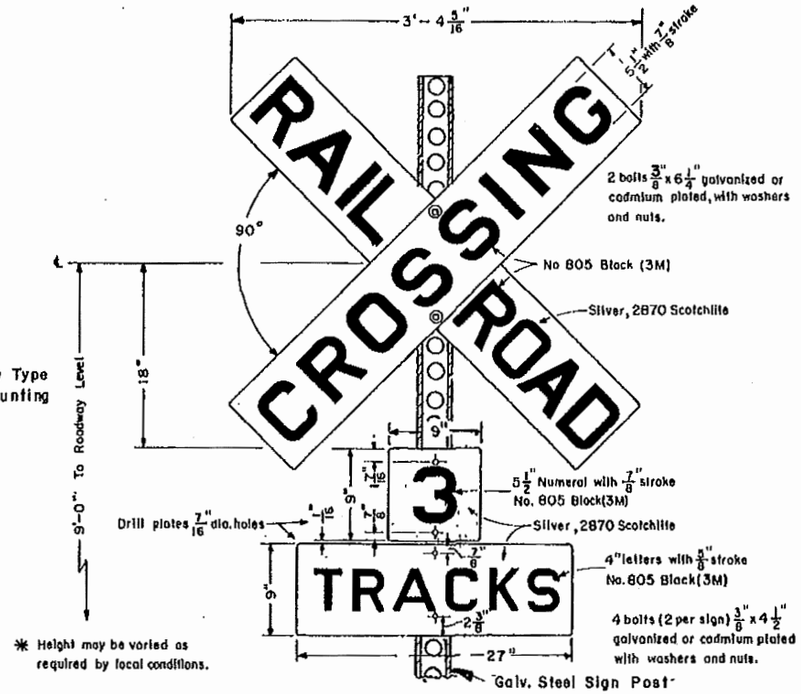


CROSSING BLADE



SECTION A-A

EXTRUDED ALUMINUM BLADES


3'-4 9/16"
5 1/2" with 7/8" stroke
RAIL ROAD CROSSING
90°
2 bolts 3/8" x 6 1/2" galvanized or cadmium plated, with washers and nuts.
No 805 Black (3M)
Silver, 2870 Scotchlite
9'-0" To Roadway Level *
18"
9"
5 1/2" Numeral with 7/8" stroke No. 805 Black (3M)
Drill plates 7/16" dia. holes
3
Silver, 2870 Scotchlite
9"
TRACKS
4" letters with 3/8" stroke No. 805 Black (3M)
4 bolts (2 per sign) 3/8" x 4 1/2" galvanized or cadmium plated with washers and nuts.
27"
Galv. Steel Sign Post
* Height may be varied as required by local conditions.

CROSSING SIGN ASSEMBLY

NOTES

Highway Crossing Sign for use where automatic signal protection is not required.

Location - The sign shall be erected on the right hand side of the roadway on each approach to the crossing. The center line of the post shall be placed not less than 10'-6" or more than 15'-0" from the center line of the track and 6 feet from the edge of the highway shoulder or 12 feet from the edge of the traveled way in rural areas and 2 feet from the face of the curb in urban areas will usually be attainable. Where unusual conditions demand, variations determined by good judgement should provide the best possible combination of view and safety clearances attainable. The height should be 9'-0" above the roadway level to the center of the crossbuck, but may be varied to suit local conditions.

Crossbuck - The blades shall be 6063-T6 extruded aluminum. The face of the blades shall be covered with No. 2870 Silver, High Intensity Grade, Scotchlite sheeting with No. 805 Black Ink (3M) letters, or equal.

Number of Tracks Sign - The sign to be used where there are two or more tracks. The number displayed on the sign shall be the total number of tracks crossed, including sidings. Normally, where the distance between tracks, measured along the highway, exceeds 100 feet, an additional crossing sign should be erected unless local conditions require otherwise. The sign shall be .081", 6061-T6 aluminum sheet. The face of the signs shall be covered with No. 2870 Silver, High Intensity Grade, Scotchlite sheeting with No. 805 Black Ink (3M) letters, or equal.

Specifications - As per current issue of the Federal Highway Administration, Part VIII "Traffic Control Systems for Railroad Grade Crossings." The letters and numerals as per current A.A.R. Signal Section Plans 1712, 1713 and 1714.

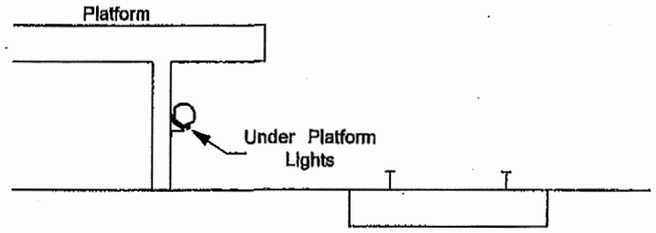
Ordering - Specify sign complete or individual crossbuck, track sign or post, in addition the numeral for the track sign must be specified. Any modifications necessary to comply with legal requirements must be specified.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3388
		Nov. 17, 1986 (1)
		ISSUE DATE / ISSUE NO.

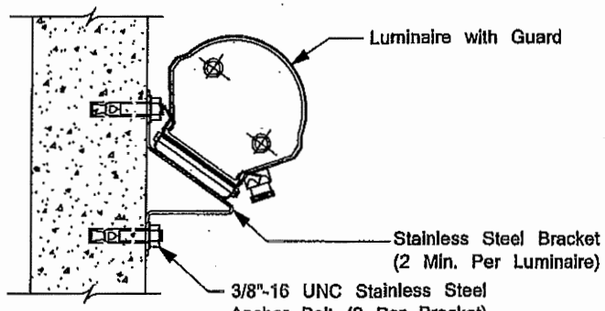
PUBLIC CROSSING NO WARNING DEVICES

Daniel Braun — ENGINEERING OFFICER

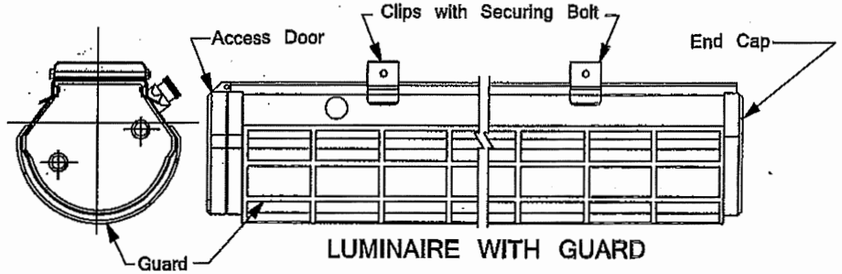
W A Marshall — CHIEF ENGINEERING OFFICER



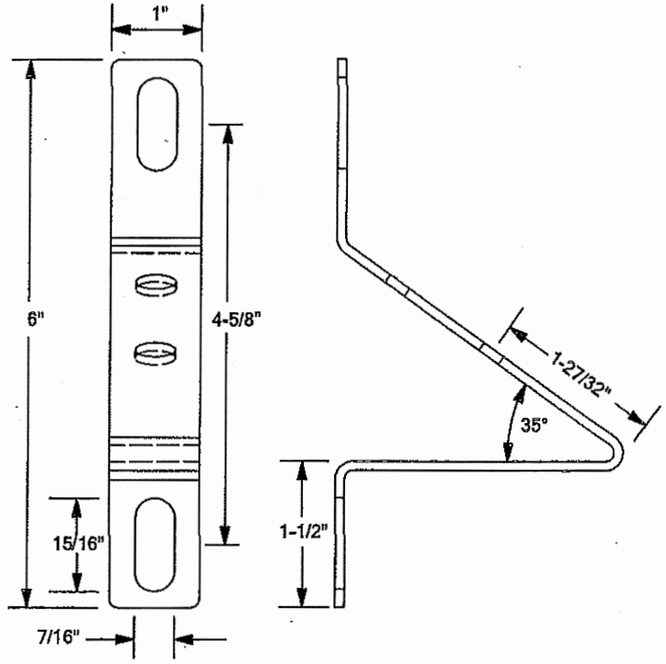
LUMINAIRE LOCATION



LUMINAIRE MOUNTING



LUMINAIRE WITH GUARD



MOUNTING BRACKET DETAIL

LUMINAIRE SPECIFICATIONS
Housing: Extruded anodized aluminum. Finish shall be resistant to UV, salt spray, and humidity per ASTM G7, ASTM B117, and ASTM D2247.
Lens: Clear extruded tempered prismatic glass protector sealed to the housing.
Housing Compartment Rating: IP67
Impact Resistance: 1K 06/ 1K 10 per Standard EN 50102.
Fire Resistance: M1 per Standard NF.P.92507.
Ballast Tray: Easily removable for maintenance purposes. Electrical components shall be connected throught a quick disconnect device with fully isolated terminals for easy servicing.
Lamp: One long twin tube compact fluorescent straight lamp, 36W.
Ballast: Electronic type, high power factor, sound rated Class A, 277 volt
Mounting Hardware: Stainless steel.
Electrical Cable Fitting: Watertight fitting.
Identification Label: Permanent identification of Manufacturer, luminaire type and model, wattage, voltage, and frequency.
Specifications based on Schreder MY2-36TT-1-277-EL-EW1-NA-CAS210-RAL5019 luminaire with P00579 Amtrak Lens Guard.

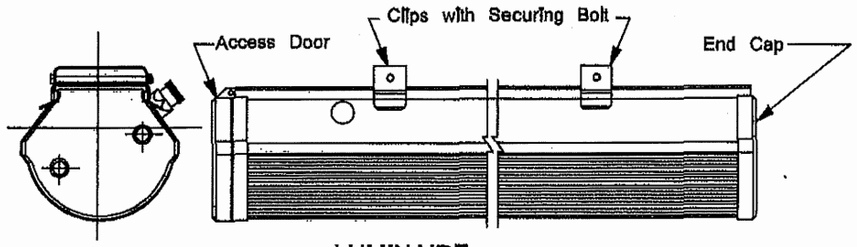
UNDER PLATFORM LIGHTING CRITERIA
Purpose: Provide lighting for walking along track area. Detail inspection of track area will require auxiliary lighting. Lights are continuously lit.
Installation: NFPA 101, National Fire Protection Agency, Life Safety Code, latest edition.
Lighting Level: 2 foot candles horizontal minimum, including Light Loss Factor (LLF) and measured at top of rail at centerline of track. Lighting level shall be provided for entire length of platform.
Design LFF: Based on a 2 year maintenance period. 70% Rated Life Factor shall be 0.95. Dirt Depreciation Factor shall 0.7. Fixture Depreciation Factor shall be 0.95. Total LLF shall be the product of these factors, or 0.95 x 0.7 x 0.95 = 0.63.
Installed Fixture Spacing Under Platform: 20ft. or less, centerline to centerline.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY | RAILROAD OPERATIONS | DWG NO. 3408 | MAR. 18, 2008 (ISSUE DATE) | 1 (ISSUE NO.)

TRACK AREA LIGHTING UNDER PLATFORMS FOR ENCLOSED STATIONS

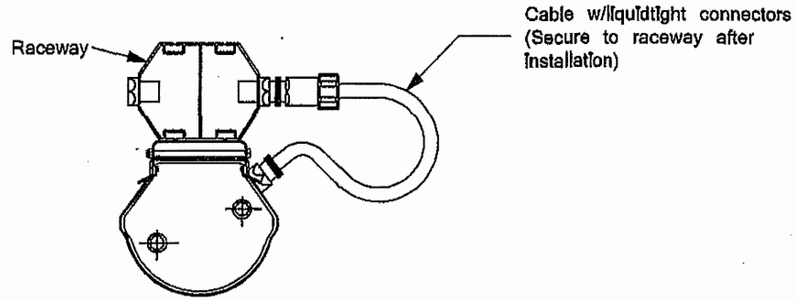
ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER



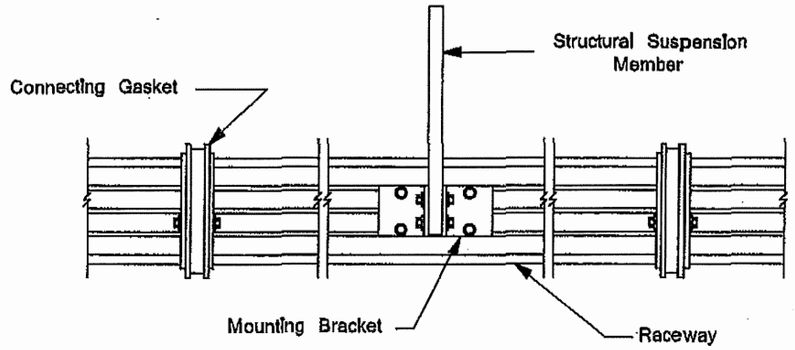
LUMINAIRE

LUMINAIRE SPECIFICATIONS
Housing: Extruded anodized aluminum. Finish shall be resistant to UV, salt spray, and humidity per ASTM G7, ASTM B117, and ASTM D2247.
Lens: Clear extruded tempered prismatic glass protector sealed to the housing.
Housing Compartment Rating: IP67
Impact Resistance: 1K 06/ 1K 10 per Standard EN 50102.
Fire Resistance: M1 per Standard NF.P.92507.
Ballast Tray: Easily removable for maintenance purposes. Electrical components shall be connected throught a quick disconnect device with fully isolated terminals for easy servicing.
Lamp: Fluorescent, T5 straight lamp, high output, 18-58 watts, 1 or 2 lamps per luminaire. Wattage, number of lamps per luminaire, and lamp length per Designer to meet minimum criteria.
Ballast: Electronic type, high power factor, sound rated Class A, 277 volt
Mounting Hardware: Stainless steel.
Electrical Cable Fitting: Watertight fitting.
Identification Label: Permanent identification of Manufacturer, luminaire type and model, wattage, voltage, and frequency.
Specification based on Schreder MY2 luminaire.



LUMINAIRE WITH ATTACHED RACEWAY

RACEWAY SPECIFICATIONS
Raceway: Extruded aluminum alloy, with anodized finish. Raceway shown with two channels - number of channels and outer dimensions to be determined by the Designer. Where channel is utilized for circuits in addition to the lighting circuits, a minimum of one spare channel shall be provided for future cables. Designer to submit cable loading calculations for approval. "T" shaped grooves along the raceway shall be provided to permit adjustment of the bracket and luminaire using concealed captive hardware.
Raceway Length: To be determined by the Designer.
Connecting Hardware: Stainless steel.
Ground Lugs: Aluminum terminals, fastened to the end cap of the raceway, one for each lighting circuit wiring channel.



RACEWAY INSTALLATION

RACEWAY INSTALLATION
Connecting Gaskets: Die cut gaskets, per Manufacturer's recommendations.
Mounting Bracket: Aluminum, with two holes for mating "U" shaped junctions.
Wiring: No. 12 AWG. Raceway shall be factory wired. Connectors between raceway sections shall be Amp Mate and Lock or approved equal, 3 poles, rated 600 volts, 15 amps, complete with fully isolated terminals. Power connections to fixtures shall alternate phases to adjacent fixtures - for a three phase system, every third fixture shall be connected to the same phase.

PLATFORM LIGHTING DESIGN CRITERIA
Purpose: Passenger station platform lighting
Installation: Per NFPA 101, National Fire Protection Agency, Life Safety Code, latest edition.
Lighting Level: 20 foot candles horizontal minimum, including Light Loss Factor (LLF) at platform level. Lighting level shall be maintained for entire length of platform.
Lighting Uniformity: Maximum ratio of 1.3 between maximum footcandles and minimum footcandles.
LLF: Based on 2 year maintenance period. 70% Rated Life Factor shall be 0.95. Dirt Depreciation factor shall be 0.7. Fixture Depreciation Factor shall be 0.95. Total LLF shall be the product of these factors, or 0.95 x 0.7 x 0.95 = 0.63
Emergency Lighting Level: 1 foot candle minimum, including LLF.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

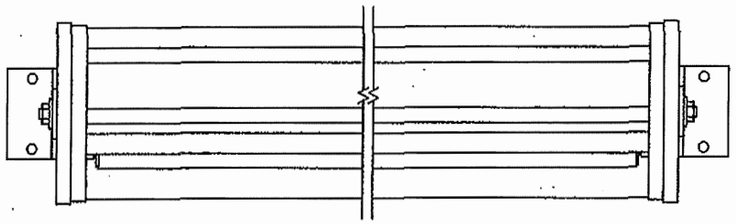
DWG NO. 3400

MAR. 18, 2008 (ISSUE DATE) (1) (ISSUE NO.)

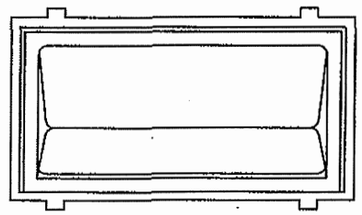
PLATFORM LIGHTING FOR ENCLOSED STATIONS

ENGINEERING OFFICER

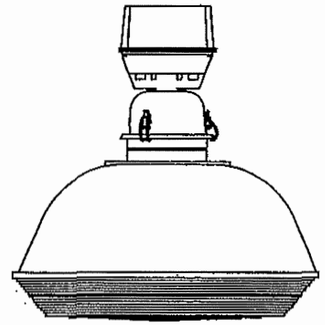
CHIEF ENGINEERING OFFICER



FLUORESCENT



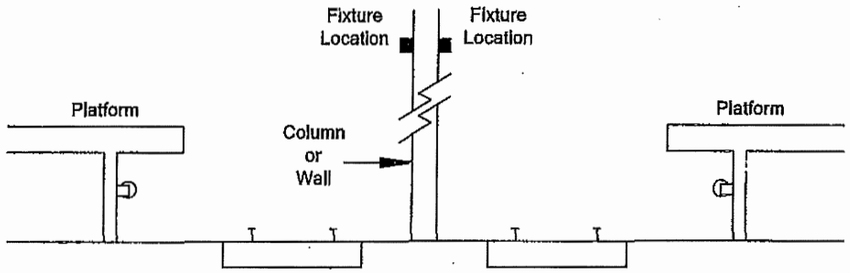
WALL/COLUMN MOUNTED
METAL HALIDE



SUSPENDED METAL HALIDE

LUMINAIRE SPECIFICATIONS
Luminaire Type: Fluorescent T5 or Metal Halide
Housing: Compartment Rating: IP67
Mounting Bracket and Hardware: Stainless steel.
Identification Label: Permanent identification of Manufacturer, luminaire type and model, wattage, voltage, and frequency.
Installation: Mounting to columns or other structures between tracks not shown, and to be provided by Designer.
Wiring: Each fixture to be grounded to power supply ground.

LIGHTING CRITERIA FOR BETWEEN TRACKS
Purpose: Provide lighting for walking within the platform track area between tracks at locations where there is no platform between the tracks. Detail inspection will require auxiliary lighting.
Installation: NFPA 101, National Fire Protection Agency, Life safety Code, latest edition.
Lighting Level: 2 foot candles minimum, including Light Loss Factor (LLF) and measured at top of rail at centerline of both tracks. Minimum lighting level applies to track area with the tracks occupied and with the tracks unoccupied.
Design LFF: Based on a 2 year maintenance period. 70% Rated Life Factor shall be 0.95 for fluorescent fixtures and 0.7 for metal halide fixtures. Dirt Depreciation Factor shall 0.7 for both fixture types. Fixture Depreciation Factor shall be 0.95. Burn-out factor shall be 1.0. Total Design LLF shall be the product of these factors, or 0.63 for fluorescent fixtures and 0.47 for metal halide fixtures.
Location: Fixtures shall be installed outside of dynamic train clearances and shall be located along the full length of track within the platform limits. Lighting height and aiming shall avoid any glare for the train operator entering and leaving the platform tracks.
Control: Each circuit between each set of tracks shall be controlled by a minimum of three switches accessible from the track level and mounted to the columns or other supports. Switches shall be located at both ends of the platform length, and at the platform midpoint. Switches shall be wired in a 3-way arrangement to permit any switch to turn all the lights for that track on or off. Each circuit shall also be controlled with a timer to automatically turn off the lights after an adjustable time period. The timer shall also include a manual by-pass to permit the lights to remain on.



LOCATION

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG NO. 3404

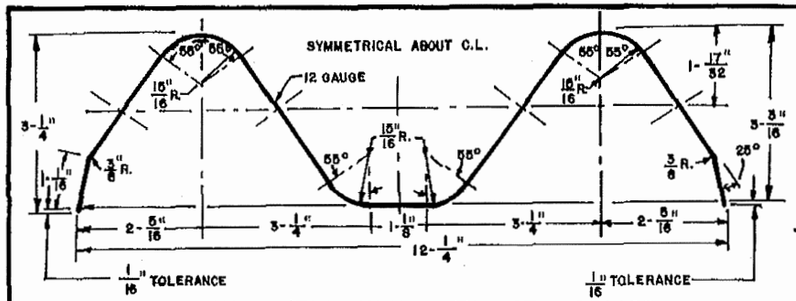
MAR. 18, 2008 (1)

ISSUE DATE ISSUE NO.

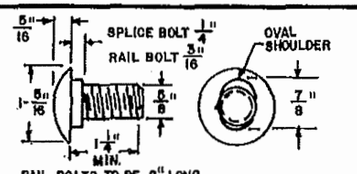
TRACK AREA LIGHTING BETWEEN TRACKS FOR ENCLOSED STATIONS

ENGINEERING OFFICER

CHIEF ENGINEERING OFFICER

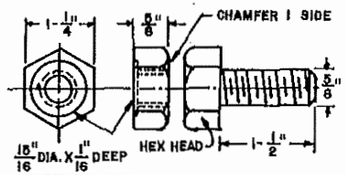


SECTION THROUGH RAIL AT SPLICE

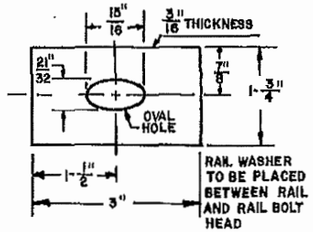


RAIL BOLTS TO BE 2" LONG
ALL BOLTS AND NUTS TO BE GALV.

RAIL & SPLICE BOLTS & NUTS

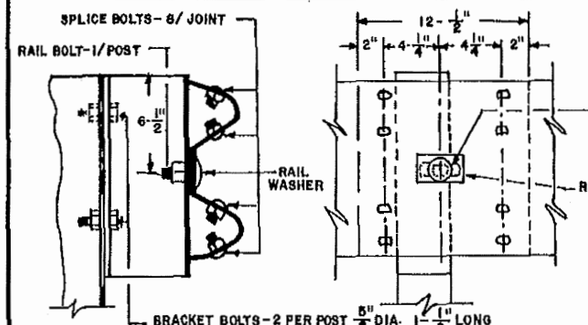


BRACKET BOLT

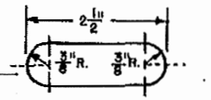


RAIL WASHER TO BE PLACED BETWEEN RAIL AND RAIL BOLT HEAD

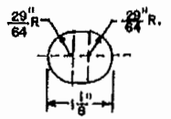
RAIL WASHER



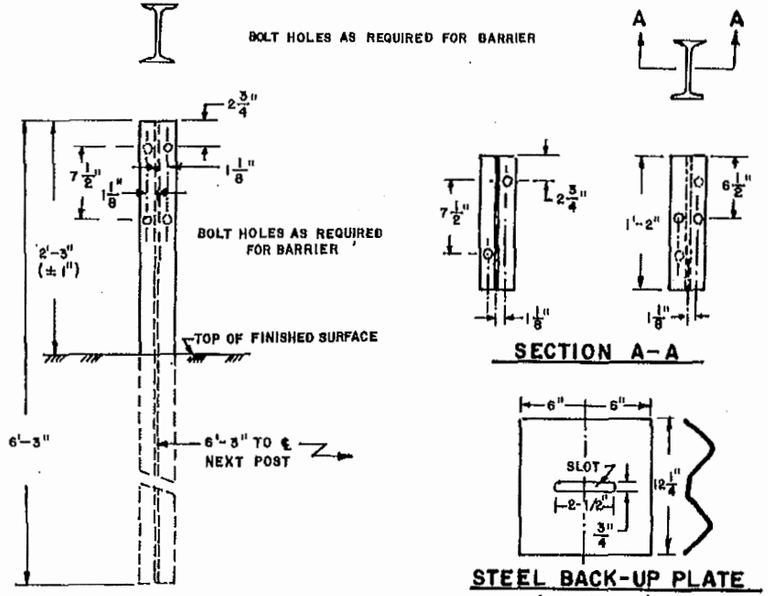
RAIL SPLICE



RAIL BOLT SLOT



SPLICE BOLT SLOT



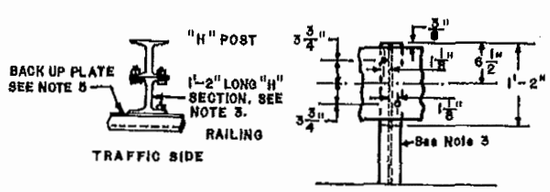
POST

POST SPACING = 6'-3" ℄ TO ℄

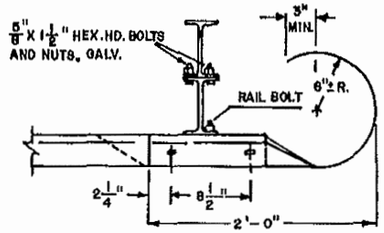
SECTION A-A

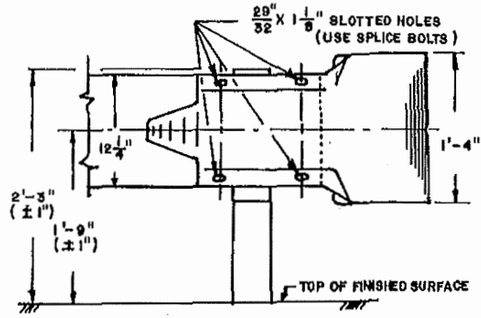
STEEL BACK-UP PLATE
(12 Gauge)

OFFSET BRACKET



TYPICAL DETAILS

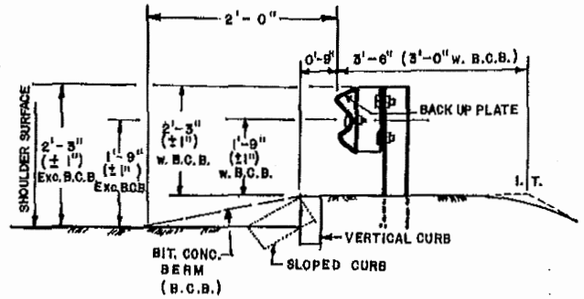




TERMINAL SECTION
(SEE NOTE 2)

NOTES:

1. Spacing of Posts to be 6'-3" centerline of Post to centerline of Post.
2. Terminal Section shown for parking areas or low vehicular speed areas Only. See Mass. Dept. of Public Works Standards for End Treatment in higher speed areas (Steel Beam Highway Guard Type SS).
3. Post and offset brackets to be fabricated from 6" X 4", 8-1/2 lbs. per linear foot, steel "H" sections.
4. Post and bracket holes to be 3/4" dia.
5. Back up plate to be used on posts where no splice occurs.
6. All metal parts to be galvanized steel.



TYPICAL PLACEMENT SECTION

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS

DWG. NO. 4056

Nov. 17, 1986 (1)

ISSUE DATE ISSUE NO.

STEEL BEAM GUARD RAIL DETAIL

Daniel Brown
ENGINEERING OFFICER

W. A. MacRae
CHIEF ENGINEERING OFFICER